



AD NO. \_\_\_\_\_  
DTC PROJECT NO. 8-CO-160-UXO-021  
REPORT NO. ATC-8642



STANDARDIZED  
UXO TECHNOLOGY DEMONSTRATION SITE  
BLIND GRID SCORING RECORD NO. 37

SITE LOCATION:  
ABERDEEN PROVING GROUND

DEMONSTRATOR:  
ZONGE ENGINEERING AND RESEARCH  
ORGANIZATION, INC  
3322 E. FORT LOWELL RD  
TUCSON, AZ 85716

PREPARED BY:  
U.S. ARMY ABERDEEN TEST CENTER  
ABERDEEN PROVING GROUND, MD 21005-5059

MAY 2003

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Prepared for:

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U.S. ARMY DEVELOPMENTAL TEST COMMAND  
ABERDEEN PROVING GROUND, MD 21005-5055

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14 MAY 2003

MEMORANDUM FOR Commander, U.S. Army Environmental Center, (SFIM-AEC-PCT/Mr. George Robitaille), 5179 Hoadley Road, Bldg E4430, Aberdeen Proving Ground, MD 21010-5401

SUBJECT: Final Scoring Record for Zonge Engineering at APG Standardized UXO Technology Demonstration Site. 8-CO-160-UXO-021

1. The U.S. Army Aberdeen Test Center is submitting the enclosed Final Scoring Record for Zonge Engineering activities at the APG Standardized UXO Technology Demonstration Site Blind Grid.
2. This document was reviewed numerous times by the Standardized UXO Technology Demonstration Site Scoring Committee and now considered a final deliverable.
3. The POC for this action is Mr. Larry Overbay. Mr. Overbay can be reached at 410-278-7620 or by email at lwoverba@atc.army.mil.

FOR THE COMMANDER:

CHARLES D. VALZ  
Director, Survivability/Lethality Core

Encl  
as

## REPORT DOCUMENTATION PAGE

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14. ABSTRACT This firing record documents the efforts of Zonge Engineering utilizing the APG Standardized UXO Technology Demonstration Site Blind Grid. The firing record was coordinated by Larry Overbay and was coordinated by the Standardized UXO Technology Demonstration Site Program Scoring Committee. Organizations on the committee include the U.S. Army Corps of Engineers, the Environmental Security Technology Certification Program, the Strategic Environmental Research and Development Program, the Institute for Defense Analysis, the U.S. Army Environmental Center, and the U.S. Army Aberdeen Test Center.						
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## **SECTION 1. GENERAL INFORMATION**

### **1.1 BACKGROUND**

Technologies under development for the detection and discrimination of unexploded ordnance (UXO) require testing so that their performance can be characterized. To that end, standardized test sites have been developed at Aberdeen Proving Ground (APG), Maryland and Yuma Proving Ground, Arizona. These test sites provide a diversity of geology, climate, terrain, and weather as well as diversity in ordnance and clutter. Testing at these sites is independently administered and analyzed by the government for the purposes of characterizing technologies, tracking performance with system development, comparing performance of different systems, and comparing performance in different environments.

The Standardized UXO Technology Demonstration Site Program is a multi-agency program spearheaded by the U.S. Army Environmental Center (AEC). The U.S. Army Aberdeen Test Center (ATC) and the U.S. Army Edgewood Research, Development and Engineering Center (ERDC) provide programmatic support. The program is being funded and supported by the Environmental Security Technology Certification Program (ESTCP), the Strategic Environmental Research and Development Program (SERDP) and the Army Environmental Quality Technology Program (EQT).

### **1.2 SCORING OBJECTIVES**

The objective in the Standardized UXO Technology Demonstration Site Program is to evaluate the detection and discrimination capabilities of a given technology under various field and soil conditions. Inert munitions and clutter items are positioned in various orientations and depths in the ground.

Data is being developed for the scoring committee through demonstration activities at the standardized test sites to assess the following performance matrices:

- a. Detection and discrimination under realistic scenarios that vary targets, geology, clutter, topography, and vegetation.
- b. Cost, time and manpower requirements.
- c. Ability to analyze survey data in a timely manner and provide prioritized "Target Lists" with associated confidence levels.
- d. Collection of high quality, ground-truth, geo-referenced data for post-demonstration analysis.

#### **1.2.1 Scoring Methodology**

- a. The scoring of the demonstrator's performance is conducted in two stages. These two stages are termed the RESPONSE STAGE and DISCRIMINATION STAGE. For both stages, the probability of detection ( $P_d$ ) and the false alarms are reported as receiver-operating

characteristic (ROC) curves. False alarms are divided into those anomalies that correspond to emplaced clutter items, measuring the probability of false positive ( $P_{fp}$ ), and those that do not correspond to any known item, termed background alarms.

b. The RESPONSE STAGE scoring evaluates the ability of the system to detect emplaced targets without regard to ability to discriminate ordnance from other anomalies. For the blind grid RESPONSE STAGE, the demonstrator provides the scoring committee with a target response from each and every grid square along with a noise level below which target responses are deemed insufficient to warrant further investigation. This list is generated with minimal processing and, since a value is provided for every grid square, will include signals both above and below the system noise level.

c. The DISCRIMINATION STAGE evaluates the demonstrator's ability to correctly identify ordnance as such and to reject clutter. For the blind grid DISCRIMINATION STAGE, the demonstrator provides the scoring committee with the output of the algorithms applied in the discrimination-stage processing for each grid square. The values in this list are prioritized based on the demonstrator's determination that a grid square is likely to contain ordnance. Thus, higher output values are indicative of higher confidence that an ordnance item is present at the specified location. For digital signal processing, priority ranking is based on algorithm output. For other discrimination approaches, priority ranking is based on human (subjective) judgment. The demonstrator also provides the threshold in the prioritized ranking that provides optimum performance, (i.e. that retains all detected ordnance and rejects the maximum amount of clutter).

d. The demonstrator is also scored on EFFICIENCY and REJECTION RATIO, which measures the effectiveness of the discrimination stage processing. The goal of discrimination is to retain the greatest number of ordnance detections from the anomaly list, while rejecting the maximum number of anomalies arising from non-ordnance items. EFFICIENCY measures the amount of detected ordnance retained after discrimination, while the REJECTION RATIO measures the fraction of false alarms rejected. Both measures are defined relative to performance at the demonstrator-supplied noise level below which all responses are considered noise, i.e., the maximum ordnance detectable by the sensor and its accompanying false positive rate or background alarm rate.

### **1.2.2 Scoring Factors**

Factors to be measured and evaluated as part of this demonstration include:

a. Response Stage ROC curves:

- (1) Probability of Detection ( $P_d^{res}$ ).
- (2) Probability of False Positive ( $P_{fp}^{res}$ ).
- (3) Background Alarm Rate ( $BAR^{res}$ ) or Probability of Background Alarm ( $P_{BA}^{res}$ ).

- b. Discrimination Stage ROC curves:
  - (1) Probability of Detection ( $P_d^{\text{disc}}$ ).
  - (2) Probability of False Positive ( $P_{fp}^{\text{disc}}$ ).
  - (3) Background Alarm Rate ( $\text{BAR}^{\text{disc}}$ ) or Probability of Background Alarm ( $P_{BA}^{\text{disc}}$ ).
- c. Metrics:
  - (1) Efficiency (E).
  - (2) False Positive Rejection Rate ( $R_{fp}$ ).
  - (3) Background Alarm Rejection Rate ( $R_{BA}$ ).
- d. Other:
  - (1) Probability of Detection by Size and Depth.
  - (2) Classification by type (i.e., 20-mm, 40-mm, 105-mm, etc.).
  - (3) Location accuracy.
  - (4) Equipment setup, calibration time and corresponding man-hour requirements.
  - (5) Survey time and corresponding man-hour requirements.
  - (6) Re-acquisition/resurvey time and man-hour requirements (if any).
  - (7) Downtime due to system malfunctions and maintenance requirements.

### **1.3 STANDARD AND NONSTANDARD TARGETS**

The standard and nonstandard ordnance items emplaced in the test areas are listed in Table 1. Standardized targets are members of a set of specific ordnance items that have identical properties to all other items in the set (caliber, configuration, size, weight, aspect ratio, material, filler, magnetic remittance, and nomenclature). Nonstandard targets are ordnance items having properties that differ from those in the set of standardized targets.

**TABLE 1. ORDNANCE**

<b>Standard Type</b>	<b>Nonstandard (NS)</b>
20-mm Projectile M55	20-mm Projectile M55
	20-mm Projectile M97
40-mm Grenades M385	40-mm Grenades M385
40-mm Projectile MKII Bodies	40-mm Projectile M813
BDU-28 Submunition	
BLU-26 Submunition	
M42 Submunition	
57-mm Projectile APC M86	
60-mm Mortar M49A3	60-mm Mortar (JPG)
	60-mm Mortar M49
2.75-inch Rocket M230	2.75-inch Rocket M230
	2.75-inch Rocket XM229
MK 118 ROCKEYE	
81-mm Mortar M374	81-mm Mortar (JPG)
	81-mm Mortar M374
105-mm Heat Rounds M456	
105-mm Projectile M60	105-mm Projectile M60
155-mm Projectile M483A1	155-mm Projectile M483A
	500-lb Bomb

## **SECTION 2. DEMONSTRATION**

### **2.1 DEMONSTRATOR INFORMATION**

#### **2.1.1 Demonstrator POC and Address**

Point of contact: D. D. Skip Snyder  
(520) 327-5501

Address: Zonge Engineering and Research Organization, Inc  
3322 E. Fort Lowell Rd  
Tucson, AZ 85716

#### **2.1.2 System Description (Provided by Demonstrator)**

Figure 1 shows an annotated photograph (without block diagram). The basic 4-D TEM acquisition system consists of three major hardware sub-systems:

- a. GDP-32II Transceiver Sub-System
- b. Antenna Cart Sub-System
- c. GPS Navigation Sub-System

GDP-32II Transceiver Sub-System(not shown in photograph). The GDP-32II transceiver subsystem consists of a 3-channel high-speed digital data acquisition system together with a circuit board level fast switching NanoTEM transmitter (NT-32). The instrument transmits a bipolar current waveform at a pulse repetition frequency of 32 Hz. The transmitter is designed for rapid shutoff of current when working into relatively low inductance loads. With the antenna array we will be deploying at APG, the current shutoff time will be approximately  $5 \mu\text{s}$ . Secondary transients produced by nearby conductors illuminated by the transmitter field are sampled at a rate of 800 kHz and composited into 31 time windows over the time interval  $1 \leq t \leq 2000 \mu\text{s}$ .

Antenna Cart Sub-System. The cart-mounted antenna array consists of a single horizontal transmitter loop with an area of approximately  $1 \text{ m}^2$  mounted together with three mutually orthogonal receiver loops. Cart attitude (heading, pitch, and roll) is transduced with a digital compass/tiltmeter.

GPS Navigation Sub-System. Local positioning and geo-referencing of the Zonge NanoTEM system is accomplished using a Leica SR530 Real Time Kinematic (RTK) GPS system. The Leica system consists of two dual-frequency geodetic quality receivers that are in radio communication with each other. A roving GPS antenna is mounted on the NanoTEM antenna cart.

The operator carries the controller along with the GDP-32II instrument package. The antenna has been located in a position where it does not measurably affect the TEM measurements.

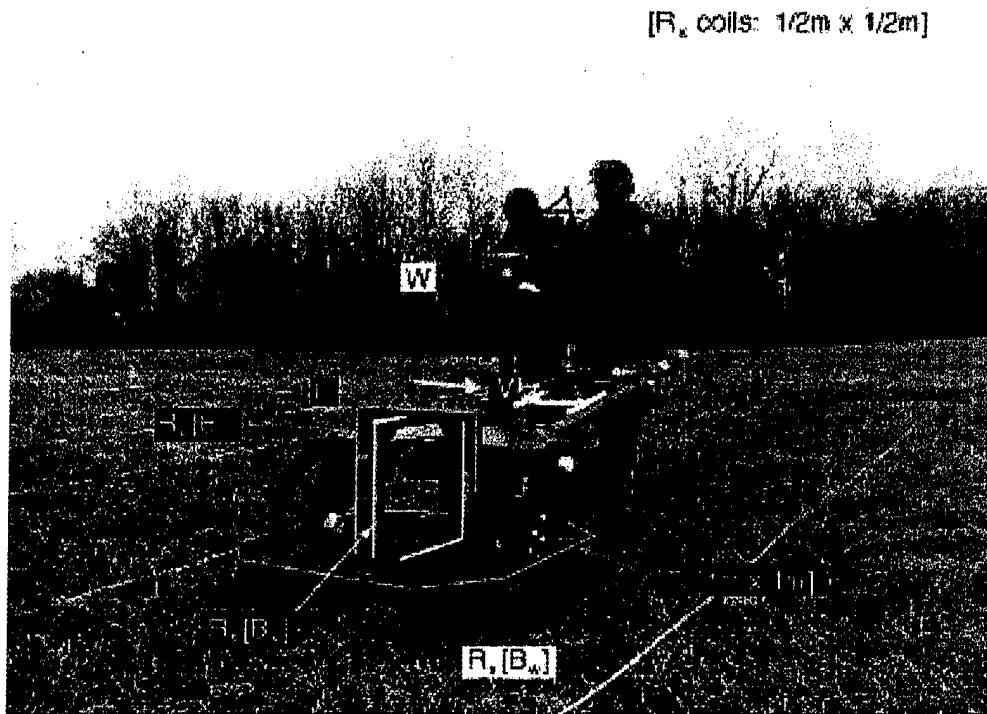


Figure 1. Demonstrator's system.

### **2.1.3 Data Processing Description (Provided by Demonstrator)**

DNT Data Processing Subsystem. The data recorded by the GDP-32II, the compass subsystem, and the Leica GPS system are processed using a software system designed around Geosoft's Oasis Montaj. The data sets are merged based on time-stamps recorded in each data set. Raw data files are imported into Oasis through a proprietary preprocessing program (DNT Reduce). This program performs basic corrections for cart geometry (e.g., GPS antenna offsets), antenna parameters (e.g., transmitter moment, and effective receiver area), and merges the data with the GPS positions if available. DNT Reduce can act as a stand-alone program or can be executed from within Oasis. In either case, the program generates both text based files (CSV) and/or a binary file that can be immediately imported by Oasis. The files output by Oasis meet the requirements as the raw sensor data that must be delivered at end of the field demonstration. After importation into Oasis, standard features of Oasis together with custom Geosoft executable (GX) modules will be used to perform the following processing steps on the data acquired as a result of activities at APG.

- (1) Component rotation from cart-fixed to geographic coordinate system (Custom Oasis GX).
- (2) Generation of composite time windows (Custom GX).
- (3) Background removal or leveling.
- (4) Map generation (Oasis).
- (5) Target picking (Oasis/UXO).
- (6) Target parameterization (DNT/Model).
- (7) Target classification (DNT/Classify).

#### **2.1.4 Data Submission Format**

Data was submitted for scoring in accordance with data submission protocols outlined in the Standardized UXO Technology Demonstration Site Handbook (app E, ref 1). This data is not included in this report in order to protect ground truth information.

#### **2.1.5 Demonstrator Quality Assurance and Quality Control (Provided by Demonstrator)**

Overall data quality is controlled and documented by means of a series of tests that are run two or more times daily depending on the tests. There are three standard quality control (QC) checks that will made two or more times for every field day:

- (1) Standard Check. Measure instrument response from a standard target (e.g., 3-in. steel sphere).
- (2) Position Check. Check GPS cart position at a specified station.
- (3) Latency Check. Check to see that a target anomaly is recorded at the same position when crossed with the cart from opposite directions.
- (4) Timing Check. Check for timing drift between GPS time and GDP-32II time.

The first three checks listed above are combined into a Cal Ball check procedure. We locate and mark a station that is conveniently adjacent to the area to be surveyed. We place the calibration target at this point and mark the end points of a 10- to 15-m line that traverses over the calibration target and the position base. The test procedure consists of a slow survey over the calibration target to the end of the calibration line. The cart is then turned around and a second slow traverse is made over the target in the opposite direction. Finally, the cart is slowly backed up from the beginning of the cal ball line until it is centered directly over the target. We continue to record data for a short period (10 to 30 sec) while the cart remains in a static position over the target. At the end of the data recording, we record the GPS position of the cart as a static way point that can be compared with previously recorded positions. The cal ball check procedure can

be used not only to make the first three checks (i.e., standard, position, and latency) but also to document any timing drift or offset. The position of the target is precisely known and hence we can check for a time offset indicated by the difference in time between where the target peak occurs and where the GPS indicates that the cart arrives at the true target position. The real time clock in the GDP-32II is also checked using a custom program together with the SynPaq GPS satellite timing system we use to synchronize the real time clock to GPS time.

The principal objective of the field work to be conducted under this demonstration plan will be to acquire high quality dynamic data sets over the 43- by 27-m Calibration Lanes and the 43- by 43-m Blind Test Grid. The Calibration Lanes will be surveyed in one direction with a lane spacing of 1/2 m. The survey will be repeated at a higher speed (e.g., 60 to 80 m/min) in order to assess the degradation in data quality as a function of survey speed. The blind test grid will be surveyed in two orthogonal directions each with lane spacings of 1/2 m. The remainder of the time will be spent in surveying the Open Field Site.

### **2.1.6 Additional Records**

The following record(s) of this demonstrator's field activities can be accessed via the Internet as MS Word files at <http://aec.army.mil/usaec/technology/uxo03.html>.

Open Field Record Scoring Record. Zonge surveyed the open field scenario. Record will be generated.

## **2.2 ABERDEEN PROVING GROUND SITE INFORMATION**

### **2.2.1 Location**

The APG Standardized Test Site is located within a secured range area of the Aberdeen Area of APG adjacent to the ATC Trench Warfare Test Range. The Aberdeen Area of APG is located approximately 30 miles northeast of Baltimore at the northern end of the Chesapeake Bay. The Standardized Test Site encompasses 17 acres of upland and lowland flats, woods and wetlands.

### **2.2.2 Soil Type**

According to the soils survey conducted for the entire area of Aberdeen Proving Ground in 1998, the test site consists primarily of Elkton Series type soil. The Elkton series consist of very deep, slowly permeable, poorly drained soils. These soils formed in silty aeolian sediments and the underlying loamy alluvial and marine sediments. They are on upland and lowland flats and in depressions of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 2 percent.

ERDEC conducted a site-specific analysis in May of 2002 (ref 2). The results basically matched the soil survey mentioned above. Seventy percent of the samples taken were classified as silty loam. The majority (77 percent) of the soil samples had a measured water content between 15- and 30-percent with the water content decreasing slightly with depth.

For more details concerning the soil properties at the APG test site, go to <http://aec.army.mil/usaec/technology/uxo-soils.pdf> on the web to view the entire soils description report.

### **2.2.3 Test Areas**

A description of the test site areas at APG is included in Table 2.

**TABLE 2. TEST SITE AREAS**

<b>Area</b>	<b>Description</b>
Calibration Grid	Contains 14 standard ordnance items buried in six positions at various angles and depths to allow demonstrator to calibrate their equipment.
Blind Test Grid	Contains 400 grid cells in a 0.2-hectare (0.5 acre) site. The center of each grid cell contains ordnance, clutter or nothing.

### **SECTION 3. FIELD DATA**

#### **3.1 DATE OF FIELD ACTIVITIES (19 TO 20 AUGUST 2002)**

#### **3.2 AREAS TESTED/NUMBER OF HOURS**

Areas tested and number of hours are summarized in Table 3.

**TABLE 3. AREAS TESTED AND NUMBER OF HOURS**

<b>Area</b>	<b>Utilized</b>	<b>Number of Hours</b>
Calibration Lanes	Yes	4.5
Blind Test Grid	Yes	3.2

#### **3.3 TEST CONDITIONS**

##### **3.3.1 Weather Conditions**

An ATC weather station located approximately 2 miles west of the test site was used to record average temperature and precipitation on an hourly basis for each day of operation. The temperatures listed in Table 4 represent the average temperature during field operations from 0700 through 1700 hours while the precipitation data represents a daily total amount of rainfall. Hourly weather logs used to generate this summary are provided in Appendix B.

**TABLE 4. TEMPERATURE/PRECIPITATION DATA SUMMARY**

<b>Date, 02</b>	<b>Average Temperature, °F</b>	<b>Total Daily Precipitation, in.</b>
19 August	87.0	0.00
20 August	84.2	0.00

##### **3.3.2 Field Conditions**

Zonge Engineering surveyed the Calibration Lanes and Blind Test Grid on 19 and 20 August respectively. The field was mostly dry throughout the survey.

##### **3.3.3 Soil Moisture**

The soil moisture logs are included in Appendix C. Three soil probes were placed at various locations of the site to capture soil moisture data: open field, open field lowland (wet) and open field scenario 1 wooded area. Measurements were collected in percent moisture and were taken twice daily (morning and afternoon) from five different soil layers (0 to 6 in., 6 to 12 in., 12 to 24 in., 24 to 36 in. and 36 to 48 in.) from each probe.

The soil moisture data collected is summarized in Table 5. The average moisture content was calculated by averaging the morning and afternoon measurements for each layer of each probe for the duration of the field operations.

**TABLE 5. SOIL MOISTURE DATA SUMMARY**

Layer, in.	Average Moisture Content, %	Standard Deviation, %
Open Field Probe		
0 to 6	13.71	10.15
6 to 12	6.85	4.45
12 to 24	1.80	0.23
24 to 36	4.40	1.25
36 to 48	0.18	0.15
Wet Probe		
0 to 6	20.11	9.31
6 to 12	12.25	3.68
12 to 24	12.53	1.80
24 to 36	30.61	2.98
36 to 48	36.40	1.68

### **3.4 FIELD ACTIVITIES**

#### **3.4.1 Setup/Mobilization**

These activities included initial mobilization and daily equipment preparation and breakdown. On 19 August a crew of three people took 4.83 hours to perform the initial set-up and mobilization. On 20 August, 65 minutes were spent preparing the equipment before beginning the survey and 20 minutes were spent breaking down equipment at the end of that day. Daily start/stop activities totaled 1.42 hours.

#### **3.4.2 Calibration**

In addition to spending 4.52 hours in the Calibration Lanes, the equipment was calibrated before each data run using either a calibration ball or the GPS. The single in-field calibration took approximately 60 seconds for a total calibration time of 4.53 hours.

#### **3.4.3 Downtime Occasions**

Occasions of downtime are grouped into five categories: equipment/data checks or equipment maintenance, equipment failure and repair, weather, Demonstration Site issues, or breaks/lunch. All downtime is included for the purposes of calculating labor costs (section 5)

except for downtime due to Demonstration Site issues. Demonstration Site issues, while noted in the Daily Log, are considered non-chargeable downtime for the purposes of calculating labor costs and are not discussed. Breaks and lunches are not discussed either.

#### **3.4.3.1 Equipment/data checks, maintenance.**

No equipment, data checks or maintenance downtimes were recorded while in the blind grid.

#### **3.4.3.2 Equipment failure or repair.**

No equipment failures were recorded while in the blind grid.

#### **3.4.3.3 Weather.**

No weather delays occurred while in the blind grid.

#### **3.4.4 Data Collection**

The demonstrators spent 2.13 hours collecting data in the blind grid. This time excludes breaks/lunches, and downtimes due to the above factors.

#### **3.4.5 Demobilization**

A crew of two people took 1.75 hours to breakdown and pack up equipment for demobilization.

### **3.5 PROCESSING TIME**

Data was submitted for scoring within the 30-day period. Since this demonstrator was the first to use the site, issues outside of the demonstrator's control required data to be resubmitted on a total of 4 separate occasions. On each occasion, the demonstrator was responsive and timely.

### **3.6 DEMONSTRATOR'S FIELD PERSONNEL**

- (1) Donald D. Snyder, Principal Investigator
- (2) Chester S. Lide
- (3) Timothy Nordstrom
- (4) Michael J. Raymond

### **3.7 DEMONSTRATOR'S FIELD SURVEYING METHOD**

Zonge Engineering began surveying in the northeast corner of the field continuing in a north/south direction. Zonge used radio frequency telemetry between a base station GPS unit and their hand-pushed cart. They used 100-meter tapes approximately 1 meter apart to cover all of the intended areas.

### **3.8 SUMMARY OF DAILY LOGS**

Detailed daily activity logs are included as Appendix D.

## SECTION 4. TECHNICAL PERFORMANCE RESULTS

### 4.1 ROC CURVES USING ALL ORDNANCE CATEGORIES

Figure 2 shows the probability of detection for the response stage ( $P_d^{\text{res}}$ ) and the discrimination stage ( $P_d^{\text{disc}}$ ) versus their respective probability of false positive. Figure 3 shows both probabilities plotted against their respective probability of background alarm. Both figures use horizontal lines to illustrate the performance of the demonstrator at two demonstrator-specified points: at the system noise level for the response stage, representing the point below which targets are not considered detectable, and at the demonstrator's recommended threshold level for the discrimination stage, defining the subset of targets the demonstrator would recommend digging based on discrimination. Note that all points have been rounded to protect the ground truth.

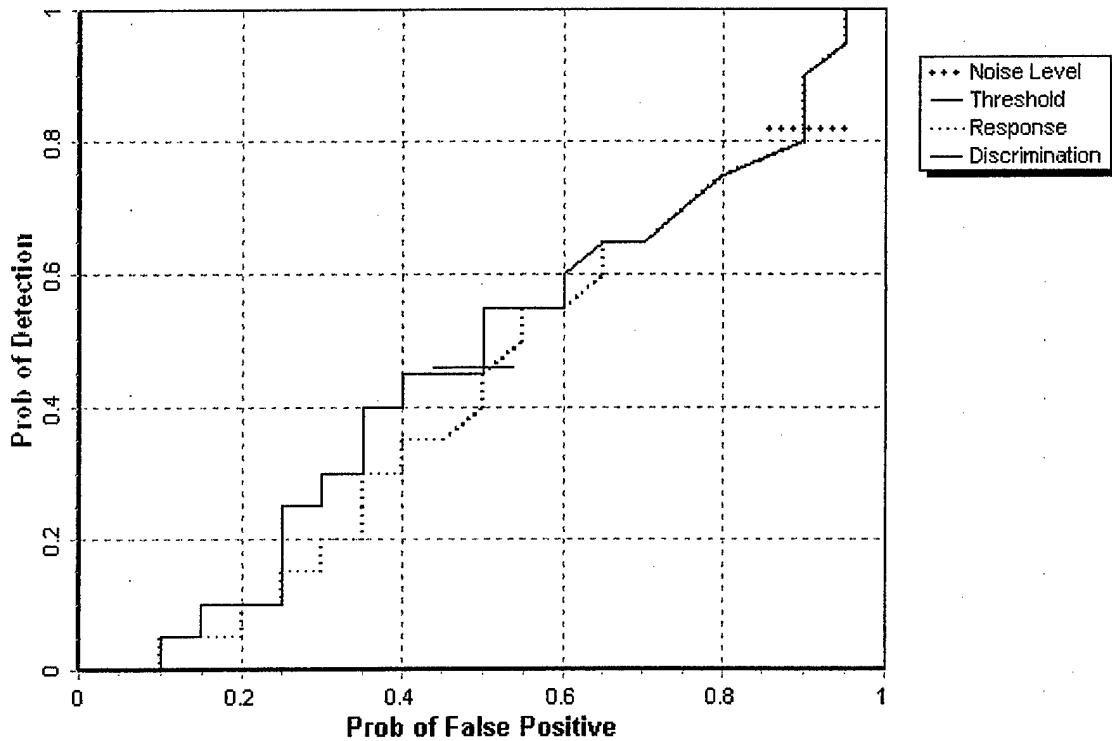


Figure 2. Blind grid probability of detection for response and discrimination stages versus their respective probability of false positive over all ordnance categories combined.

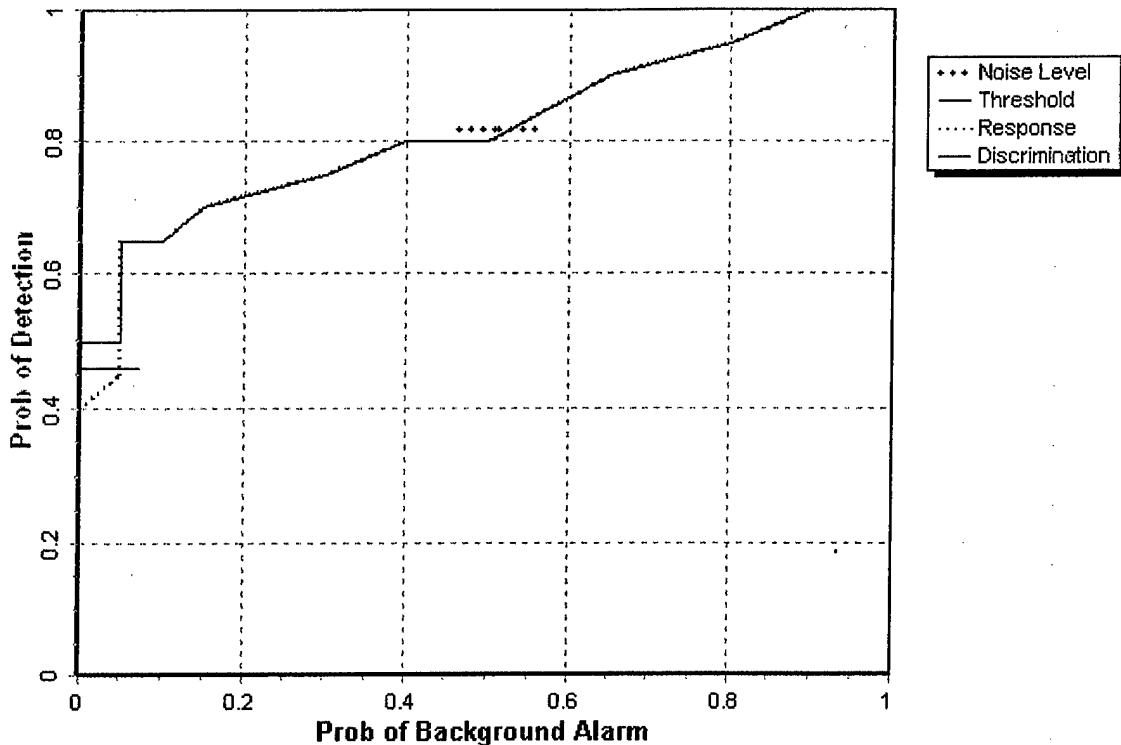


Figure 3. Blind grid probability of detection for response and discrimination stages versus their respective probability of background alarm over all ordnance categories combined.

#### 4.2 ROC CURVES USING ORDNANCE LARGER THAN 20 MM

Ordnance items 20 mm and smaller are often the most difficult ordnance items to detect and discriminate. There is great interest to determine the system's capabilities if these most difficult items are not included. Therefore, the following ROC curves are presented to show system performance for items larger than 20 mm.

Figure 4 shows the probability of detection for the response stage ( $P_d^{\text{res}}$ ) and the discrimination stage ( $P_d^{\text{disc}}$ ) versus their respective probability of false positive. Figure 5 shows both probabilities plotted against their respective probability of background alarm. Both figures use horizontal lines to illustrate the performance of the demonstrator at two demonstrator-specified points: at the system noise level for the response stage, representing the point below which targets are not considered detectable, and at the demonstrator's recommended threshold level for the discrimination stage, defining the subset of targets the demonstrator would recommend digging based on discrimination. Note that all points have been rounded to protect the ground truth.

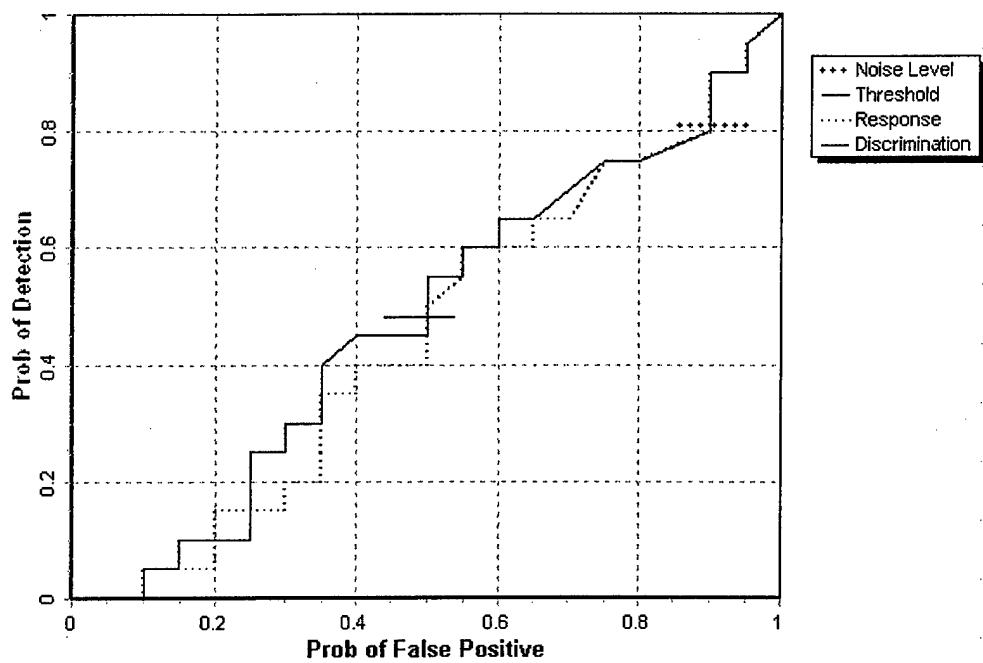


Figure 4. Blind grid probability of detection for response and discrimination stages versus their respective probability of false positive for all ordnance larger than 20-mm.

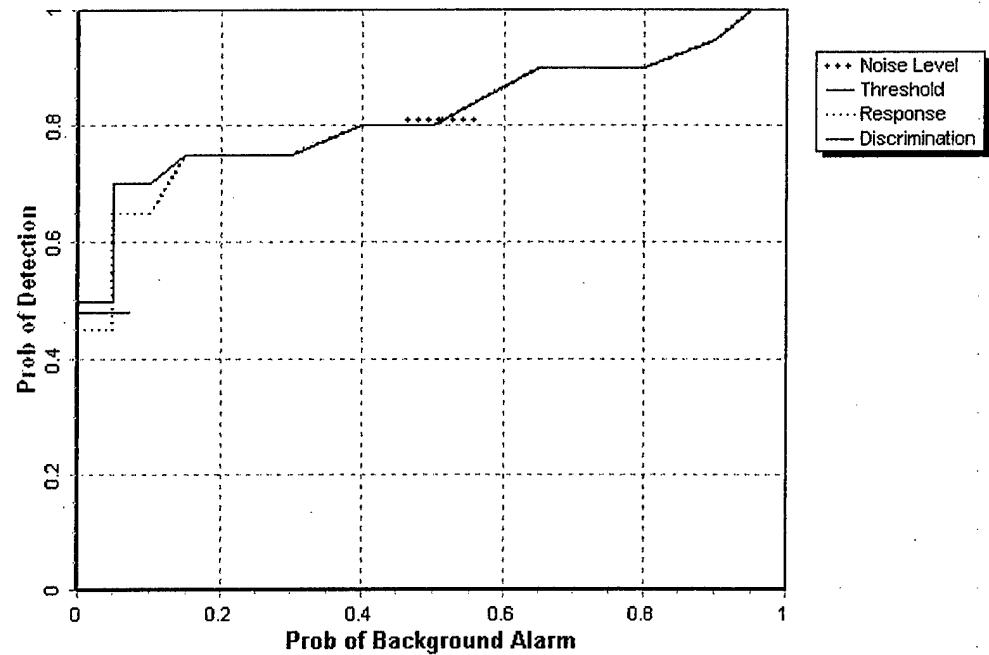


Figure 5. Blind grid probability of detection for response and discrimination stages versus their respective probabilities of background alarm for all ordnance larger than 20-mm.

### 4.3 PERFORMANCE SUMMARIES

Results for the Blind Grid test broken out by size, depth and nonstandard ordnance are presented in Table 6. (For cost results, see section 5.) Results by size and depth include both standard and nonstandard ordnance. The results by size show how well the demonstrator did at detecting/discriminating ordnance of a certain caliber range. (See Appendix A for size definitions.) The results are relative to the number emplaced.

The RESPONSE STAGE results are derived from the list of anomalies above the demonstrator-provided noise level. The results for the DISCRIMINATION STAGE are derived from the demonstrator's recommended threshold for optimizing UXO field cleanup by minimizing false digs and maximizing ordnance recovery. The lower 90 percent confidence limit on probability of detection and probability of false positive was calculated assuming that the number of detections and false positives are binomially distributed random variables. All results in Table 6 have been rounded to protect the ground truth. However, lower confidence limits were calculated using actual results.

**TABLE 6. SUMMARY OF BLIND GRID RESULTS**

Metric	Overall	Standard	Non-Standard	By Size			By Depth (m)		
				Small	Medium	Large	< 0.3	0.3 to <1	>= 1
<b>RESPONSE STAGE</b>									
P <sub>d</sub>	0.80	0.90	0.65	0.90	0.70	0.90	1.00	0.80	0.10
(P <sub>d</sub> Low 90 % Conf)	0.75	0.83	0.53	0.82	0.55	0.66	0.95	0.68	0.01
P <sub>fp</sub>	0.90	-	-	-	-	-	0.90	0.90	1.00
(P <sub>fp</sub> Low 90 % Conf)	0.85	-	-	-	-	-	0.81	0.81	0.56
P <sub>ba</sub>	0.50	-	-	-	-	-	-	-	-
<b>DISCRIMINATION STAGE</b>									
P <sub>d</sub>	0.45	0.50	0.35	0.45	0.40	0.50	0.55	0.40	0.00
(P <sub>d</sub> Low 90% Conf)	0.38	0.41	0.25	0.32	0.30	0.27	0.48	0.30	0.00
P <sub>fp</sub>	0.50	-	-	-	-	-	0.50	0.45	0.50
(P <sub>fp</sub> Low 90 % Conf)	0.42	-	-	-	-	-	0.42	0.35	0.14
P <sub>ba</sub>	0.00	-	-	-	-	-	-	-	-

Response Stage Noise Level: 0.00

Recommended Discrimination Stage Threshold: 50.00

Note: The response stage noise level and recommended discrimination stage threshold values are provided by the demonstrator.

#### **4.4 EFFICIENCY, REJECTION RATES, AND TYPE CLASSIFICATION**

Efficiency and rejection rates are calculated to quantify the discrimination ability at specific points of interest on the ROC curve: (1) at the point where no decrease in  $P_d$  is suffered (i.e., the efficiency is by definition equal to one) and (2) at the operator selected threshold. These values are reported in Table 7.

**TABLE 7. EFFICIENCY AND REJECTION RATES**

	<b>Efficiency (E)</b>	<b>False Positive Rejection Rate</b>	<b>Background Alarm Rejection Rate</b>
At Operating Point	0.46	0.51	0.98
With No Loss of $P_d$	1.00	0.00	0.00

At the demonstrator's recommended setting, the ordnance items that were detected and correctly discriminated were further scored on whether their correct type could be identified. Correct Type examples include "20-mm projectile, 105 HEAT Projectile, and 2.75-in. Rocket". A list of the standard type declaration required for each ordnance item was provided to demonstrators prior to testing. (For example, the standard type for the three example items are 20mmP, 105H, and 2.75 in, respectively. (Zonge was not provided with the standard type declaration list ahead of time). Data were edited for TYPE where intent could be ascertained. Intent could not be ascertained for items listed as "40mm" since both 40-mm projectiles and 40-mm grenades are emplaced. Per demonstrator's instructions, all "40mm" edited to indicate projectiles.)

**TABLE 8. CORRECT TYPE CLASSIFICATION OF TARGETS CORRECTLY DISCRIMINATED AS UXO**

<b>Size</b>	<b>% Correct</b>
Small	11.1
Medium	23.1
Large	0.0
Overall	13.9

#### **4.5 LOCATION ACCURACY**

The mean location error and standard deviations appear in Table 9. These calculations are based on average missed depth for ordnance correctly identified in the discrimination stage. Depths are measured from the closest point of the ordnance to the surface.

**TABLE 9. MEAN LOCATION ERROR AND  
STANDARD DEVIATION (M)**

	<b>Mean</b>	<b>Standard Deviation</b>
Depth	0.22	0.45

## **SECTION 5. ON-SITE LABOR COSTS**

A standardized estimate for labor costs associated with this effort was calculated as follows: the first person at the test site was designated "supervisor", the second person was designated "data analyst", and the third and following personnel were considered "field support". Standardized hourly labor rates were charged by title: supervisor at \$95.00/hour, data analyst at \$57.00/hour, and field support at \$28.50/hour.

Government representatives monitored on-site activity. All on site activities were grouped into one of ten categories: initial set-up/mobilization, daily set-up/stop, calibration, collecting data, downtime due to break/lunch, downtime due to equipment failure, downtime due to equipment/data checks or maintenance, downtime due to weather, downtime due to demonstration site issue, or demobilization. See Appendix D for the daily activity log. See section 3.4 for a summary of field activities.

The standardized cost estimate associated with the labor needed to perform the field activities is presented in Table 10. Note that calibration time includes time spent in the Calibration Lanes as well as field calibrations. "Site survey time" includes daily set-up/stop time, collecting data, breaks/lunch, downtime due to equipment/data checks or maintenance, downtime due to failure, and downtime due to weather.

**TABLE 10. ON-SITE LABOR COSTS**

	No. People	Hourly Wage	Hours	Cost
<b>INITIAL SETUP</b>				
Supervisor	1	\$95.00	4.83	\$458.85
Data Analyst	1	57.00	4.83	275.31
Field Support	1	28.50	4.83	137.66
SubTotal				<b>\$871.82</b>
<b>CALIBRATION</b>				
Supervisor	1	\$95.00	4.53	\$430.35
Data Analyst	1	57.00	4.53	258.21
Field Support	1	28.50	4.53	129.1
SubTotal				<b>\$817.67</b>
<b>SITE SURVEY</b>				
Supervisor	1	\$95.00	3.23	\$306.85
Data Analyst	1	57.00	3.23	184.11
Field Support	1	28.50	3.23	92.06
SubTotal				<b>\$583.02</b>

See notes at end of table.

**TABLE 10. CONT'D**

	No. People	Hourly Wage	Hours	Cost
<b>DEMOBILIZATION</b>				
Supervisor	1	\$95.00	1.75	\$166.25
Data Analyst	1	57.00	1.75	99.75
Field Support	0	28.50	0.00	0.00
SubTotal				<b>\$266.00</b>
<b>TOTAL</b>				<b>\$2,538.50</b>

Notes: Calibration time includes time spent in the Calibration Lanes as well as calibration before each data run.

Site Survey time includes daily setup/stop time, collecting data, breaks/lunch, downtime due to system maintenance, failure, and weather.

## **SECTION 6. COMPARISON OF RESULTS TO DATE**

The open field scenario was also surveyed during this site visit. An Open Field Record will be generated including a comparison to this record.

## APPENDIX A. TERMS AND DEFINITIONS

### GENERAL DEFINITIONS

Anomaly: Location of a system response deemed to warrant further investigation by the demonstrator for consideration as an emplaced ordnance item.

Detection: An anomaly location that is within  $R_{\text{halo}}$  of an emplaced ordnance item.

Emplaced Ordnance: An ordnance item buried by the government at a specified location in the test site.

Emplaced Clutter: A clutter item (i.e. non-ordnance item) buried by the government at a specified location in the test site.

$R_{\text{halo}}$ : A pre-determined radius about the periphery of an emplaced item (clutter or ordnance) within which a location identified by the demonstrator as being of interest is considered to be a response from that item. If multiple declarations lie within  $R_{\text{halo}}$  of any item (clutter or ordnance), the declaration with the highest signal output within the  $R_{\text{halo}}$  will be utilized. For the purpose of this program, a circular halo 0.5 meters in radius will be placed around the center of the object for all clutter and ordnance items less than 0.6 meters in length. When ordnance items are longer than 0.6 meters, the halo becomes an ellipse where the minor axis remains 0.5 meters and the major axis is equal to the half length of the ordnance plus 0.5 meters.

Small Ordnance: Caliber of ordnance less than or equal to 40 mm (includes 20-mm projectile, 40-mm projectile, submunitions BLU-26, BLU-63, and M42).

Medium Ordnance: Caliber of ordnance greater than 40-mm and less than or equal to 81-mm (includes 57-mm projectile, 60-mm mortar, 2.75 inch Rocket, MK118 Rockeye, 81-mm mortar).

Large Ordnance: Caliber of ordnance greater than 81-mm (includes 105-mm HEAT, 105-mm projectile, 155-mm projectile, 500 pound bomb).

Shallow: Items buried less than 0.3 meters below ground surface.

Medium: Items buried greater than or equal to 0.3 meters and less than 1 meter below ground surface.

Deep: Items buried greater than or equal to 1 meter below ground surface.

Response Stage Noise Level: The level that represents the point below which anomalies are not considered detectable. Demonstrators are required to provide the recommended noise level for the Blind Grid Test Area.

**Discrimination Stage Threshold:** The demonstrator selected threshold level that they believe provides optimum performance of the system by retaining all detectable ordnance and rejecting the maximum amount of clutter. This level defines the subset of anomalies the demonstrator would recommend digging based on discrimination.

**Binomially Distributed Random Variable:** A random variable of the type which has only two possible outcomes, say success and failure, is repeated for  $n$  independent trials with the probability  $p$  of success and the probability  $1-p$  of failure being the same for each trial. The number of successes  $x$  observed in the  $n$  trials is an estimate of  $p$  and is considered to be a binomially distributed random variable.

## RESPONSE AND DISCRIMINATION STAGE DATA

The scoring of the demonstrator's performance is conducted in two stages. These two stages are termed the RESPONSE STAGE and DISCRIMINATION STAGE. For both stages, the probability of detection ( $P_d$ ) and the false alarms are reported as receiver operating characteristic (ROC) curves. False alarms are divided into those anomalies that correspond to emplaced clutter items, measuring the probability of false positive ( $P_{fp}$ ) and those that do not correspond to any known item, termed background alarms.

The RESPONSE STAGE scoring evaluates the ability of the system to detect emplaced targets without regard to ability to discriminate ordnance from other anomalies. For the RESPONSE STAGE, the demonstrator provides the scoring committee with the location and signal strength of all anomalies that the demonstrator has deemed sufficient to warrant further investigation and/or processing as potential emplaced ordnance items. This list is generated with minimal processing (e.g., this list will include all signals above the system noise threshold). As such, it represents the most inclusive list of anomalies.

The DISCRIMINATION STAGE evaluates the demonstrator's ability to correctly identify ordnance as such, and to reject clutter. For the same locations as in the RESPONSE STAGE anomaly list, the DISCRIMINATION STAGE list contains the output of the algorithms applied in the discrimination-stage processing. This list is prioritized based on the demonstrator's determination that an anomaly location is likely to contain ordnance. Thus, higher output values are indicative of higher confidence that an ordnance item is present at the specified location. For electronic signal processing, priority ranking is based on algorithm output. For other systems, priority ranking is based on human judgment. The demonstrator also selects the threshold that the demonstrator believes will provide "optimum" system performance, (i.e., that retains all the detected ordnance and rejects the maximum amount of clutter).

Note: The two lists provided by the demonstrator contain identical numbers of potential target locations. They differ only in the priority ranking of the declarations.

## RESPONSE STAGE DEFINITIONS

Response Stage Probability of Detection ( $P_d^{\text{res}}$ ):  $P_d^{\text{res}} = (\text{No. of response-stage detections}) / (\text{No. of emplaced ordnance in the test site})$ .

Response Stage False Positive ( $fp^{\text{res}}$ ): An anomaly location that is within  $R_{\text{halo}}$  of an emplaced clutter item.

Response Stage Probability of False Positive ( $P_{fp}^{\text{res}}$ ):  $P_{fp}^{\text{res}} = (\text{No. of response-stage false positives}) / (\text{No. of emplaced clutter items})$ .

Response Stage Background Alarm ( $ba^{\text{res}}$ ): An anomaly in a blind grid cell that contains neither emplaced ordnance nor an emplaced clutter item. An anomaly location in the open field or scenarios that is outside  $R_{\text{halo}}$  of any emplaced ordnance or emplaced clutter item.

Response Stage Probability of Background Alarm ( $P_{ba}^{\text{res}}$ ): Blind Grid only:  $P_{ba}^{\text{res}} = (\text{No. of response-stage background alarms}) / (\text{No. of empty grid locations})$ .

Response Stage Background Alarm Rate (BAR $^{\text{res}}$ ): Open Field only:  $\text{BAR}^{\text{res}} = (\text{No. of response-stage background alarms}) / (\text{arbitrary constant})$ .

Note that the quantities  $P_d^{\text{res}}$ ,  $P_{fp}^{\text{res}}$ ,  $P_{ba}^{\text{res}}$ , and  $\text{BAR}^{\text{res}}$  are functions of  $t^{\text{res}}$ , the threshold applied to the response-stage signal strength. These quantities can therefore be written as  $P_d^{\text{res}}(t^{\text{res}})$ ,  $P_{fp}^{\text{res}}(t^{\text{res}})$ ,  $P_{ba}^{\text{res}}(t^{\text{res}})$ , and  $\text{BAR}^{\text{res}}(t^{\text{res}})$ .

## DISCRIMINATION STAGE DEFINITIONS

Discrimination: The application of a signal processing algorithm or human judgment to response-stage data that discriminates ordnance from clutter. Discrimination should identify anomalies that the demonstrator has high confidence correspond to ordnance, as well as those that the demonstrator has high confidence correspond to nonordnance or background returns. The former should be ranked with highest priority and the latter with lowest.

Discrimination Stage Probability of Detection ( $P_d^{\text{disc}}$ ):  $P_d^{\text{disc}} = (\text{No. of discrimination-stage detections}) / (\text{No. of emplaced ordnance in the test site})$

Discrimination Stage False Positive ( $fp^{\text{disc}}$ ): An anomaly location that is within  $R_{\text{halo}}$  of an emplaced clutter item.

Discrimination Stage Probability of False Positive ( $P_{fp}^{\text{disc}}$ ):  $P_{fp}^{\text{disc}} = (\text{No. of discrimination stage false positives}) / (\text{No. of emplaced clutter items})$

Discrimination Stage Background Alarm ( $ba^{\text{disc}}$ ): An anomaly in a blind grid cell that contains neither emplaced ordnance nor an emplaced clutter item. An anomaly location in the open field or scenarios that is outside  $R_{\text{halo}}$  of any emplaced ordnance or emplaced clutter item.

Discrimination Stage Probability of Background Alarm ( $P_{ba}^{disc}$ ):  $P_{ba}^{disc} = (\text{No. of discrimination-stage background alarms}) / (\text{No. of empty grid locations})$

Discrimination Stage Background Alarm Rate (BAR<sup>disc</sup>):  $\text{BAR}^{disc} = (\text{No. of discrimination-stage background alarms}) / (\text{arbitrary constant})$

Note that the quantities  $P_d^{disc}$ ,  $P_{fp}^{disc}$ ,  $P_{ba}^{disc}$ , and  $\text{BAR}^{disc}$  are functions of  $t^{disc}$ , the threshold applied to the discrimination-stage signal strength. These quantities can therefore be written as  $P_d^{disc}(t^{disc})$ ,  $P_{fp}^{disc}(t^{disc})$ ,  $P_{ba}^{disc}(t^{disc})$ , and  $\text{BAR}^{disc}(t^{disc})$ .

### RECEIVER-OPERATING CHARACTERISTIC (ROC) CURVES

ROC curves at both the response and discrimination stages can be constructed based on the above definitions. The ROC curves plot the relationship between  $P_d$  vs.  $P_{fp}$  and  $P_d$  vs. BAR or  $P_{ba}$  as the threshold applied to the signal strength is varied from its minimum ( $t_{min}$ ) to its maximum ( $t_{max}$ ) value.<sup>1</sup> Figure 1 shows how  $P_d$  vs.  $P_{fp}$  and  $P_d$  vs. BAR are combined into ROC curves. Note that the “res” and “disc” superscripts have been suppressed from all the variables for clarity.

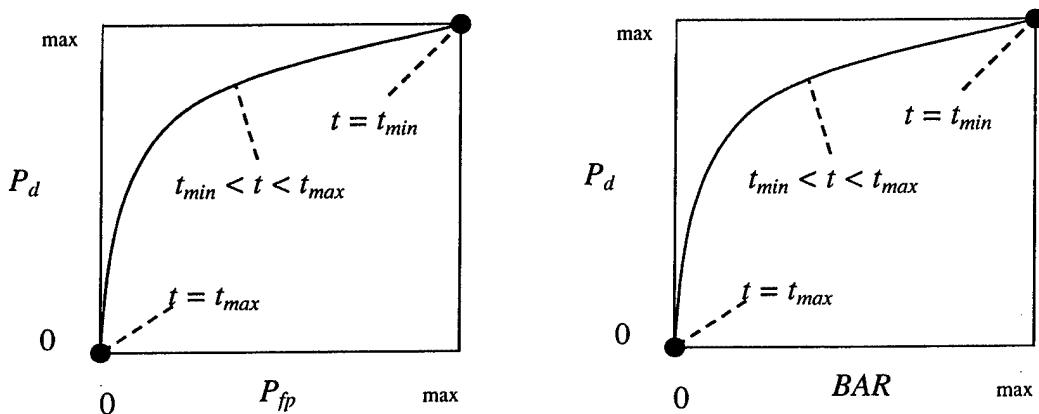


Figure A-1. ROC curves for open-field testing. Each curve applies to both the response and discrimination stages.

<sup>1</sup>Strictly speaking, ROC curves plot the  $P_d$  vs.  $P_{fa}$  over a pre-determined and fixed number of detection opportunities (some of the opportunities are located over ordnance and others are located over clutter or blank spots). In an open field scenario, each system suppresses its signal strength reports until some bare-minimum signal response is received by the system. Consequently, the open field ROC curves do not have information from low signal-output locations, and, furthermore, different contractors report their signals over a different set of locations on the ground. These ROC curves are thus not true to the strict definition of ROC curves as defined in textbooks on detection theory. Note, however, that the ROC curves obtained in the Blind Grid test sites are true ROC curves.

## METRICS TO CHARACTERIZE THE DISCRIMINATION STAGE

The demonstrator is also scored on efficiency and rejection ratio, which measure the effectiveness of the discrimination stage processing. The goal of discrimination is to retain the greatest number of ordnance detections from the anomaly list, while rejecting the maximum number of anomalies arising from nonordnance items. The efficiency measures the amount of detected ordnance retained by the discrimination, while the rejection ratio measures the fraction of false alarms rejected. Both measures are defined relative to the entire response list, i.e., the maximum ordnance detectable by the sensor and its accompanying false positive rate or background alarm rate.

Efficiency (E):  $E = P_d^{\text{disc}}(t^{\text{disc}})/P_d^{\text{res}}(t_{\min}^{\text{res}})$ ; Measures (at a threshold of interest), the degree to which the maximum theoretical detection performance of the sensor system (as determined by the response stage  $t_{\min}$ ) is preserved after application of discrimination techniques. Efficiency is a number between 0 and 1. An efficiency of 1 implies that all of the ordnance initially detected in the response stage was retained at the specified threshold in the discrimination stage,  $t^{\text{disc}}$ .

False Positive Rejection Rate ( $R_{fp}$ ):  $R_{fp} = 1 - [P_{fp}^{\text{disc}}(t^{\text{disc}})/P_{fp}^{\text{res}}(t_{\min}^{\text{res}})]$ ; Measures (at a threshold of interest), the degree to which the sensor system's false positive performance is improved over the maximum false positive performance (as determined by the response stage  $t_{\min}$ ). The rejection rate is a number between 0 and 1. A rejection rate of 1 implies that all emplaced clutter initially detected in the response stage were correctly rejected at the specified threshold in the discrimination stage.

Background Alarm Rejection Rate ( $R_{ba}$ ):

BLIND GRID:  $R_{ba} = 1 - [P_{ba}^{\text{disc}}(t^{\text{disc}})/P_{ba}^{\text{res}}(t_{\min}^{\text{res}})]$

OPEN FIELD:  $R_{ba} = 1 - [\text{BAR}^{\text{disc}}(t^{\text{disc}})/\text{BAR}^{\text{res}}(t_{\min}^{\text{res}})]$

Measures the degree to which the discrimination stage correctly rejects background alarms initially detected in the response stage. The rejection rate is a number between 0 and 1. A rejection rate of 1 implies that all background alarms initially detected in the response stage were rejected at the specified threshold in the discrimination stage.

## APPENDIX B. WEATHER LOG

TABLE B-1. WEATHER LOG

DCP 7 Data from Phillips Airfield							
	Time	Avg Temp.	Max. Temp	Min. Temp	RH	Station Press.	Precip.
Date	(EDST)	(°F)	(°F)	(°F)	(%)	(MB)	(")
19-Aug-02	2:00	80.1	81.4	79.1	77	29.81	0.00
19-Aug-02	3:00	81.6	82.5	80.6	66	29.81	0.00
19-Aug-02	4:00	79.7	81.9	77.5	71	29.82	0.00
19-Aug-02	5:00	77.7	81.5	74.5	77	29.82	0.00
19-Aug-02	6:00	74.0	75.8	72.7	87	29.83	0.00
19-Aug-02	7:00	73.3	74.3	72.7	88	29.84	0.00
19-Aug-02	8:00	78.0	80.7	74.0	76	29.84	0.00
19-Aug-02	9:00	82.1	83.8	80.6	65	29.86	0.00
19-Aug-02	10:00	84.8	87.2	83.1	59	29.87	0.00
19-Aug-02	11:00	86.9	88.4	85.6	56	29.89	0.00
19-Aug-02	12:00	89.4	91.3	87.9	52	29.89	0.00
19-Aug-02	13:00	89.8	91.4	88.0	52	29.87	0.00
19-Aug-02	14:00	91.3	93.2	89.1	49	29.85	0.00
19-Aug-02	15:00	93.4	94.7	92.6	44	29.84	0.00
19-Aug-02	16:00	94.0	95.1	93.0	43	29.82	0.00
19-Aug-02	17:00	93.8	94.8	92.7	43	29.79	0.00
19-Aug-02	18:00	92.3	93.3	91.2	46	29.77	0.00
19-Aug-02	19:00	91.9	92.4	91.2	47	29.76	0.00
19-Aug-02	20:00	89.3	91.8	86.4	52	29.76	0.00
19-Aug-02	21:00	85.7	88.1	82.9	60	29.77	0.00
19-Aug-02	22:00	81.3	83.3	80.3	73	29.79	0.00
19-Aug-02	23:00	79.3	80.5	78.4	79	29.79	0.00
19-Aug-02	23:59	77.5	79.0	76.5	85	29.80	0.00
20-Aug-02	1:00	76.7	77.6	75.9	87	29.80	0.00
20-Aug-02	2:00	76.4	77.6	75.7	89	29.80	0.00
20-Aug-02	3:00	77.8	81.2	76.6	90	29.79	0.00
20-Aug-02	4:00	79.8	81.8	78.7	73	29.81	0.00
20-Aug-02	5:00	77.6	78.8	76.7	78	29.80	0.00
20-Aug-02	6:00	75.6	77.0	74.2	84	29.83	0.00
20-Aug-02	7:00	74.8	75.6	74.1	87	29.85	0.00
20-Aug-02	8:00	76.8	78.0	75.1	82	29.88	0.00
20-Aug-02	9:00	78.7	80.9	77.2	76	29.89	0.00
20-Aug-02	10:00	82.4	83.9	80.6	68	29.90	0.00
20-Aug-02	11:00	83.3	85.7	82.1	63	29.92	0.00
20-Aug-02	12:00	85.7	87.8	83.5	57	29.93	0.00
20-Aug-02	13:00	87.3	89.1	86.3	52	29.93	0.00
20-Aug-02	14:00	88.2	89.1	87.1	48	29.92	0.00
20-Aug-02	15:00	88.9	91.5	86.7	46	29.92	0.00
20-Aug-02	16:00	90.4	92.6	88.8	42	29.92	0.00
20-Aug-02	17:00	89.7	91.4	88.5	43	29.92	0.00
20-Aug-02	18:00	89.2	89.8	88.5	44	29.93	0.00
20-Aug-02	19:00	87.6	88.9	86.6	45	29.94	0.00
20-Aug-02	20:00	85.3	87.0	83.6	46	29.97	0.00

TABLE B-1 CONT'D

DCP 7 Data from Phillips Airfield		Time	Avg Temp.	Max. Temp	Min. Temp	RH	Station Press.	Precip.
Date	(EDST)		(°F)	(°F)	(°F)	(%)	(MB)	(")
20-Aug-02	21:00		82.3	84.0	81.1	50	29.99	0.00
20-Aug-02	22:00		80.5	81.5	79.4	51	30.02	0.00
20-Aug-02	23:00		78.9	79.8	78.2	53	30.03	0.00
20-Aug-02	0:00		78.1	79.6	76.4	55	30.05	0.00
21-Aug-02	0:59		78.1	80.0	76.6	64	30.07	0.00
21-Aug-02	2:00		75.7	77.0	74.2	81	30.07	0.00
21-Aug-02	3:00		74.6	75.4	74.0	83	30.09	0.00
21-Aug-02	4:00		73.9	75.0	72.3	85	30.11	0.00
21-Aug-02	5:00		72.1	73.3	70.5	90	30.11	0.00
21-Aug-02	6:00		69.9	71.0	67.8	93	30.13	0.00
21-Aug-02	7:00		68.5	70.2	67.2	95	30.15	0.00
21-Aug-02	8:00		73.0	75.7	69.9	85	30.17	0.00
21-Aug-02	9:00		77.1	78.5	75.5	74	30.19	0.00
21-Aug-02	10:00		79.6	80.8	78.3	64	30.19	0.00
21-Aug-02	11:00		81.6	82.7	80.1	55	30.20	0.00
21-Aug-02	12:00		83.6	85.3	82.0	49	30.20	0.00
21-Aug-02	13:00		85.6	87.0	84.3	42	30.19	0.00
21-Aug-02	14:00		85.4	87.2	84.1	40	30.19	0.00
21-Aug-02	15:00		87.2	89.4	85.3	37	30.17	0.00
21-Aug-02	16:00		87.9	89.9	85.4	34	30.15	0.00
21-Aug-02	17:00		88.4	89.5	87.6	31	30.13	0.00
21-Aug-02	18:00		88.0	88.6	87.5	31	30.13	0.00
21-Aug-02	19:00		86.9	88.1	84.2	36	30.13	0.00
21-Aug-02	20:00		82.0	84.3	79.6	53	30.14	0.00
21-Aug-02	21:00		78.6	79.9	77.2	57	30.16	0.00
21-Aug-02	22:00		76.5	77.7	75.1	59	30.18	0.00
21-Aug-02	23:00		74.9	75.8	74.0	71	30.18	0.00
21-Aug-02	0:00		73.9	74.5	73.2	74	30.18	0.00
22-Aug-02	0:59		73.3	73.9	72.8	75	30.18	0.00
22-Aug-02	2:00		73.3	73.9	72.6	76	30.18	0.00
22-Aug-02	3:00		72.4	73.7	71.7	78	30.17	0.00
22-Aug-02	4:00		72.6	73.3	71.9	79	30.16	0.00
22-Aug-02	5:00		72.1	72.7	71.4	81	30.15	0.00
22-Aug-02	6:00		72.7	73.4	71.5	78	30.15	0.00
22-Aug-02	7:00		71.5	72.5	70.9	78	30.15	0.00
22-Aug-02	8:00		74.1	75.8	71.8	75	30.15	0.00
22-Aug-02	9:00		77.0	78.4	75.5	71	30.15	0.00
22-Aug-02	10:00		79.4	81.9	77.6	67	30.14	0.00
22-Aug-02	11:00		82.2	83.1	81.3	57	30.13	0.00
22-Aug-02	12:00		83.1	86.0	81.5	55	30.11	0.00
22-Aug-02	13:00		85.2	86.5	84.0	51	30.08	0.00
22-Aug-02	14:00		86.0	87.6	84.7	54	30.06	0.00
22-Aug-02	15:00		87.5	89.7	85.7	52	30.02	0.00
22-Aug-02	16:00		88.4	89.6	87.3	51	29.99	0.00

TABLE B-1 CONT'D

DCP 7 Data from Phillips Airfield							
	Time	Avg Temp.	Max. Temp	Min. Temp	RH	Station Press.	Precip.
Date	(EDST)	(°F)	(°F)	(°F)	(%)	(MB)	(")
22-Aug-02	17:00	90.0	91.3	88.8	49	29.96	0.00
22-Aug-02	18:00	89.2	91.0	88.4	52	29.94	0.00
22-Aug-02	19:00	87.8	89.4	86.4	57	29.92	0.00
22-Aug-02	20:00	85.6	86.7	84.5	64	29.90	0.00
22-Aug-02	21:00	83.5	84.8	81.9	68	29.90	0.00
22-Aug-02	22:00	82.3	83.2	81.2	69	29.91	0.00
22-Aug-02	23:00	82.1	82.6	81.5	74	29.90	0.00
22-Aug-02	23:59	82.1	82.5	81.6	80	29.89	0.00
23-Aug-02	1:00	79.7	82.2	77.9	89	29.90	0.00
23-Aug-02	2:00	77.6	78.6	76.5	94	29.90	0.07
23-Aug-02	3:00	76.3	77.1	75.3	93	29.89	0.00
23-Aug-02	4:00	75.0	75.8	74.2	97	29.87	0.00
23-Aug-02	5:00	74.4	74.9	73.9	98	29.87	0.00
23-Aug-02	6:00	74.8	75.3	74.4	97	29.87	0.00
23-Aug-02	7:00	74.3	75.0	73.7	97	29.87	0.00
23-Aug-02	8:00	76.5	78.2	74.6	92	29.88	0.00
23-Aug-02	9:00	78.0	78.5	77.5	87	29.90	0.00
23-Aug-02	10:00	78.8	80.0	77.9	85	29.91	0.00
23-Aug-02	11:00	80.3	80.9	79.7	80	29.92	0.00
23-Aug-02	12:00	81.9	83.2	80.5	72	29.92	0.00
23-Aug-02	13:00	83.2	84.3	82.4	69	29.91	0.00
23-Aug-02	14:00	83.9	84.8	82.9	67	29.91	0.00
23-Aug-02	15:00	83.6	84.5	82.8	70	29.89	0.00
23-Aug-02	16:00	83.8	84.8	83.0	69	29.87	0.00
23-Aug-02	17:00	84.3	85.1	83.8	66	29.87	0.00
23-Aug-02	18:00	83.7	84.5	83.0	67	29.86	0.00
23-Aug-02	19:00	83.9	84.8	82.9	67	29.85	0.00
23-Aug-02	20:00	81.9	83.4	79.6	71	29.85	0.00
23-Aug-02	21:00	79.1	80.4	77.8	81	29.85	0.00
23-Aug-02	22:00	77.3	78.2	76.0	85	29.87	0.00
23-Aug-02	23:00	75.7	76.4	75.3	88	29.88	0.00
23-Aug-02	0:00	75.4	75.8	75.1	85	29.88	0.00
24-Aug-02	0:59	75.3	75.7	74.9	86	29.88	0.00
24-Aug-02	2:00	75.1	75.5	74.2	86	29.87	0.00
24-Aug-02	3:00	74.6	74.9	74.2	87	29.85	0.00
24-Aug-02	4:00	74.0	74.8	73.1	89	29.83	0.00
24-Aug-02	5:00	73.4	73.9	72.6	91	29.82	0.03
24-Aug-02	6:00	73.1	74.0	72.3	92	29.81	0.00
24-Aug-02	7:00	72.0	73.4	71.4	97	29.83	0.21
24-Aug-02	8:00	71.7	72.2	71.4	99	29.84	0.18
24-Aug-02	9:00	71.8	72.3	71.4	100	29.82	0.10
24-Aug-02	10:00	72.8	74.4	71.9	98	29.80	0.03
24-Aug-02	11:00	75.5	77.7	73.9	93	29.79	0.00
24-Aug-02	12:00	77.1	77.8	76.0	86	29.79	0.00

TABLE B-1 CONT'D

DCP 7 Data from Phillips Airfield							
	Time	Avg Temp.	Max. Temp	Min. Temp	RH	Station Press.	Precip.
Date	(EDST)	(°F)	(°F)	(°F)	(%)	(MB)	(")
24-Aug-02	13:00	78.7	80.6	76.4	83	29.77	0.00
24-Aug-02	14:00	81.0	83.3	79.5	77	29.76	0.00
24-Aug-02	15:00	83.7	85.7	82.2	75	29.74	0.00
24-Aug-02	16:00	86.5	88.1	84.8	68	29.70	0.00
24-Aug-02	17:00	87.1	88.3	85.8	66	29.67	0.00
24-Aug-02	18:00	86.8	88.1	85.7	69	29.67	0.00
24-Aug-02	19:00	85.4	86.5	84.5	72	29.67	0.00
24-Aug-02	20:00	79.1	84.7	74.6	83	29.66	0.29
24-Aug-02	21:00	74.7	75.8	73.1	92	29.70	0.00
24-Aug-02	22:00	75.0	75.8	74.5	94	29.72	0.00
24-Aug-02	23:00	74.2	74.8	73.9	97	29.73	0.00
24-Aug-02	0:00	73.2	74.2	72.1	98	29.74	0.00
25-Aug-02	0:59	72.5	73.1	71.6	99	29.75	0.00
25-Aug-02	2:00	72.1	73.1	71.4	98	29.76	0.00
25-Aug-02	3:00	72.2	73.1	71.5	94	29.75	0.00
25-Aug-02	4:00	72.4	73.0	71.6	93	29.75	0.00
25-Aug-02	5:00	71.7	72.4	70.9	95	29.75	0.00
25-Aug-02	6:00	71.0	72.1	69.8	96	29.77	0.00
25-Aug-02	7:00	70.1	71.5	69.4	98	29.79	0.00
25-Aug-02	8:00	72.8	74.6	71.2	88	29.81	0.00
25-Aug-02	9:00	75.3	76.4	74.1	78	29.82	0.00
25-Aug-02	10:00	77.5	78.4	76.0	71	29.84	0.00
25-Aug-02	11:00	79.5	81.3	78.2	65	29.84	0.00
25-Aug-02	12:00	81.3	82.7	79.7	58	29.84	0.00
25-Aug-02	13:00	83.3	85.3	82.0	52	29.84	0.00
25-Aug-02	14:00	84.1	85.2	83.0	47	29.84	0.00
25-Aug-02	15:00	85.3	87.0	83.6	45	29.83	0.00
25-Aug-02	16:00	86.4	87.7	85.3	42	29.82	0.00
25-Aug-02	17:00	86.3	87.7	84.7	41	29.82	0.00
25-Aug-02	18:00	86.7	87.9	85.6	39	29.83	0.00
25-Aug-02	19:00	84.6	86.0	83.5	43	29.83	0.00
25-Aug-02	20:00	81.0	84.0	78.4	54	29.85	0.00
25-Aug-02	21:00	76.4	78.6	74.8	68	29.86	0.00
25-Aug-02	22:00	73.3	75.3	72.1	78	29.88	0.00
25-Aug-02	23:00	71.4	72.7	69.8	84	29.88	0.00
25-Aug-02	23:59	69.8	71.4	68.8	86	29.89	0.00
26-Aug-02	1:00	68.4	69.6	67.2	91	29.89	0.00
26-Aug-02	2:00	66.6	67.7	65.3	93	29.89	0.00
26-Aug-02	3:00	65.8	66.5	64.9	94	29.89	0.00
26-Aug-02	4:00	65.3	66.0	64.7	96	29.89	0.00
26-Aug-02	5:00	65.6	66.4	64.4	96	29.91	0.00
26-Aug-02	6:00	66.1	66.4	65.6	97	29.92	0.00
26-Aug-02	7:00	68.1	69.0	66.0	90	29.92	0.00
26-Aug-02	8:00	70.8	73.5	68.5	88	29.94	0.00

TABLE B-1 CONT'D

DCP 7 Data from Phillips Airfield	Time	Avg Temp.	Max. Temp	Min. Temp	RH	Station Press.	Precip.
Date (EDST)	(°F)	(°F)	(°F)	(%)	(MB)	("")	
26-Aug-02 9:00	74.2	75.2	72.8	86	29.95	0.00	
26-Aug-02 10:00	75.6	76.5	74.6	81	29.95	0.00	
26-Aug-02 11:00	77.8	79.8	76.3	78	29.95	0.00	
26-Aug-02 12:00	80.0	80.8	79.3	75	29.94	0.00	
26-Aug-02 13:00	80.4	81.5	79.7	71	29.94	0.00	
26-Aug-02 14:00	82.0	83.0	81.0	63	29.93	0.00	
26-Aug-02 15:00	82.7	83.3	82.1	60	29.92	0.00	
26-Aug-02 16:00	83.4	84.2	82.4	58	29.90	0.00	
26-Aug-02 17:00	83.8	85.6	82.4	50	29.89	0.00	
26-Aug-02 18:00	84.0	85.2	82.8	43	29.89	0.00	
26-Aug-02 19:00	82.0	83.3	80.4	58	29.89	0.00	
26-Aug-02 20:00	77.9	80.8	75.5	72	29.90	0.00	
26-Aug-02 21:00	74.7	75.8	73.4	81	29.92	0.00	
26-Aug-02 22:00	71.9	73.8	70.4	88	29.93	0.00	
26-Aug-02 23:00	71.4	71.9	70.4	90	29.94	0.00	
26-Aug-02 0:00	70.3	72.0	68.5	91	29.94	0.00	
27-Aug-02 0:59	68.6	69.3	67.8	96	29.94	0.00	
27-Aug-02 2:00	67.8	68.3	67.2	97	29.94	0.00	
27-Aug-02 3:00	67.3	67.7	66.6	98	29.94	0.00	
27-Aug-02 4:00	66.4	67.1	65.7	99	29.94	0.00	
27-Aug-02 5:00	65.6	66.5	64.8	100	29.94	0.00	
27-Aug-02 6:00	65.2	65.7	64.7	100	29.95	0.00	
27-Aug-02 7:00	64.9	65.4	64.4	100	29.97	0.00	
27-Aug-02 8:00	67.6	72.3	64.6	97	29.99	0.00	
27-Aug-02 9:00	74.4	76.8	72.0	83	29.99	0.00	
27-Aug-02 10:00	78.3	80.1	76.5	70	30.01	0.00	
27-Aug-02 11:00	81.4	83.0	79.7	58	30.02	0.00	
27-Aug-02 12:00	84.5	86.5	82.6	48	30.01	0.00	
27-Aug-02 13:00	85.7	86.9	84.0	44	30.01	0.00	
27-Aug-02 14:00	85.3	86.1	84.3	46	30.01	0.00	
27-Aug-02 15:00	85.6	86.3	84.8	44	30.00	0.00	
27-Aug-02 16:00	84.2	85.2	83.5	49	30.00	0.00	
27-Aug-02 17:00	83.9	84.3	83.4	50	30.01	0.00	
27-Aug-02 18:00	82.8	83.8	81.4	57	30.02	0.00	
27-Aug-02 19:00	81.2	81.9	80.3	60	30.02	0.00	
27-Aug-02 20:00	79.9	81.0	79.0	61	30.03	0.00	
27-Aug-02 21:00	77.7	79.4	76.1	66	30.05	0.00	
27-Aug-02 22:00	77.8	78.5	76.0	65	30.06	0.00	
27-Aug-02 23:00	77.1	78.2	75.8	65	30.09	0.00	
27-Aug-02 0:00	75.2	76.9	73.1	72	30.09	0.00	
28-Aug-02 0:59	72.3	73.5	71.4	82	30.09	0.00	
28-Aug-02 2:00	72.4	73.4	71.5	83	30.09	0.00	
28-Aug-02 3:00	73.8	74.7	72.9	85	30.09	0.00	
28-Aug-02 4:00	74.5	75.0	74.0	86	30.09	0.00	

TABLE B-1 CONT'D

DCP 7 Data from Phillips Airfield								
Date	(EDST)	Time	Avg Temp.	Max. Temp	Min. Temp	RH	Station Press.	Precip.
			(°F)	(°F)	(°F)	(%)	(MB)	(")
28-Aug-02		5:00	74.1	75.1	73.3	84	30.10	0.00
28-Aug-02		6:00	74.0	74.5	73.7	84	30.10	0.00
28-Aug-02		7:00	73.9	74.6	73.2	83	30.12	0.00
28-Aug-02		8:00	72.7	73.5	72.2	89	30.14	0.00
28-Aug-02		9:00	72.6	73.2	72.0	85	30.14	0.00
28-Aug-02		10:00	72.1	73.0	71.5	90	30.15	0.00
28-Aug-02		11:00	72.6	73.2	71.7	87	30.15	0.00
28-Aug-02		12:00	71.5	72.1	70.8	84	30.15	0.00
28-Aug-02		13:00	70.9	71.3	70.4	86	30.15	0.00
28-Aug-02		14:00	71.2	71.8	70.4	86	30.15	0.00
28-Aug-02		15:00	69.6	70.8	68.2	88	30.15	0.10
28-Aug-02		16:00	68.4	69.1	67.9	90	30.15	0.04
28-Aug-02		17:00	68.1	68.6	67.6	93	30.15	0.04
28-Aug-02		18:00	68.2	68.9	67.6	93	30.16	0.02
28-Aug-02		19:00	67.4	68.7	66.4	92	30.16	0.04
28-Aug-02		20:00	65.9	66.6	64.9	92	30.17	0.07
28-Aug-02		21:00	64.0	65.3	62.7	88	30.17	0.07
28-Aug-02		22:00	62.1	62.9	61.3	92	30.17	0.10
28-Aug-02		23:00	60.8	61.7	60.2	94	30.15	0.10
28-Aug-02		23:59	60.5	61.2	60.2	95	30.13	0.06
29-Aug-02		1:00	61.2	61.8	60.5	96	30.12	0.05
29-Aug-02		2:00	62.1	62.7	61.4	95	30.09	0.03
29-Aug-02		3:00	62.6	63.1	62.2	95	30.07	0.01
29-Aug-02		4:00	62.6	62.9	62.2	95	30.05	0.03
29-Aug-02		5:00	63.0	63.5	62.2	95	30.04	0.03
29-Aug-02		6:00	62.6	63.3	62.0	95	30.04	0.03
29-Aug-02		7:00	61.9	62.5	61.5	95	30.03	0.02
29-Aug-02		8:00	61.9	62.2	61.5	95	30.05	0.00
29-Aug-02		9:00	62.3	63.1	61.7	94	30.06	0.00
29-Aug-02		10:00	63.4	63.9	62.7	91	30.07	0.00
29-Aug-02		11:00	64.3	64.8	63.4	89	30.07	0.00
29-Aug-02		12:00	64.9	65.6	64.2	87	30.06	0.00
29-Aug-02		13:00	65.8	66.9	65.1	85	30.06	0.00
29-Aug-02		14:00	67.3	68.9	66.5	82	30.05	0.00
29-Aug-02		15:00	68.3	69.1	67.8	81	30.06	0.00
29-Aug-02		16:00	68.4	69.4	67.8	81	30.06	0.00
29-Aug-02		17:00	68.6	69.2	68.1	81	30.06	0.00
29-Aug-02		18:00	69.0	69.8	68.4	80	30.05	0.00
29-Aug-02		19:00	68.6	69.1	68.2	80	30.06	0.00
29-Aug-02		20:00	68.0	68.5	67.2	83	30.06	0.00
29-Aug-02		21:00	67.3	67.8	66.6	86	30.08	0.00
29-Aug-02		22:00	66.6	67.0	66.3	90	30.09	0.00
29-Aug-02		23:00	66.6	67.2	65.9	89	30.09	0.00
29-Aug-02		0:00	66.6	67.1	66.1	87	30.10	0.00

TABLE B-1 CONT'D

DCP 7 Data from Phillips Airfield							
	Time	Avg Temp.	Max. Temp	Min. Temp	RH	Station Press.	Precip.
Date	(EDST)	(°F)	(°F)	(°F)	(%)	(MB)	("")
30-Aug-02	0:59	66.4	66.7	66.0	87	30.09	0.00
30-Aug-02	2:00	66.1	66.5	65.8	87	30.09	0.00
30-Aug-02	3:00	65.8	66.3	65.4	87	30.09	0.00
30-Aug-02	4:00	65.6	66.1	65.2	87	30.09	0.00
30-Aug-02	5:00	65.3	65.8	64.9	88	30.10	0.00
30-Aug-02	6:00	65.0	65.4	64.6	89	30.12	0.00
30-Aug-02	7:00	65.1	65.4	64.7	88	30.13	0.00
30-Aug-02	8:00	65.5	66.1	65.1	87	30.15	0.00
30-Aug-02	9:00	66.3	67.0	65.8	85	30.17	0.00
30-Aug-02	10:00	66.8	67.2	66.4	80	30.17	0.00
30-Aug-02	11:00	66.7	67.2	66.3	77	30.18	0.00
30-Aug-02	12:00	67.5	68.2	66.7	76	30.19	0.00
30-Aug-02	13:00	68.1	68.8	67.7	76	30.19	0.00
30-Aug-02	14:00	68.8	69.4	68.3	74	30.19	0.00
30-Aug-02	15:00	69.1	69.6	68.6	74	30.19	0.00
30-Aug-02	16:00	69.2	69.7	68.7	73	30.19	0.00
30-Aug-02	17:00	69.5	70.3	68.6	73	30.20	0.00
30-Aug-02	18:00	69.7	70.2	69.2	72	30.20	0.00
30-Aug-02	19:00	69.6	70.3	68.8	72	30.20	0.00
30-Aug-02	20:00	67.1	69.1	64.3	80	30.21	0.00
30-Aug-02	21:00	63.2	64.6	61.7	93	30.22	0.00
30-Aug-02	22:00	62.5	63.4	61.6	95	30.23	0.00
30-Aug-02	23:00	61.5	62.2	61.0	98	30.24	0.00
30-Aug-02	0:00	60.9	61.4	60.5	99	30.24	0.00
31-Aug-02	0:59	60.7	61.3	60.2	99	30.25	0.00
31-Aug-02	2:00	60.5	60.9	60.1	100	30.26	0.00
31-Aug-02	3:00	60.5	61.0	60.1	100	30.26	0.00
31-Aug-02	4:00	61.8	63.4	60.4	98	30.25	0.00
31-Aug-02	5:00	63.2	63.7	62.8	96	30.25	0.00
31-Aug-02	6:00	62.4	63.5	61.3	97	30.26	0.00
31-Aug-02	7:00	61.2	63.3	60.4	98	30.28	0.00
31-Aug-02	8:00	63.8	67.0	62.6	92	30.30	0.00
31-Aug-02	9:00	69.0	71.2	66.7	83	30.31	0.00
31-Aug-02	10:00	72.4	73.7	70.8	75	30.32	0.00
31-Aug-02	11:00	74.5	76.2	73.2	69	30.33	0.00
31-Aug-02	12:00	77.4	78.6	75.8	57	30.33	0.00
31-Aug-02	13:00	78.1	79.4	77.1	56	30.33	0.00
31-Aug-02	14:00	79.5	81.3	77.8	55	30.33	0.00
31-Aug-02	15:00	81.2	82.3	79.9	48	30.32	0.00
31-Aug-02	16:00	80.2	81.7	79.0	50	30.32	0.00
31-Aug-02	17:00	79.7	81.0	78.9	51	30.33	0.00
31-Aug-02	18:00	77.7	79.1	76.1	55	30.32	0.00
31-Aug-02	19:00	75.1	76.6	73.7	64	30.33	0.00
31-Aug-02	20:00	71.9	74.0	70.0	75	30.35	0.00

TABLE B-1 CONT'D

DCP 7 Data from Phillips Airfield		Time	Avg Temp.	Max. Temp	Min. Temp	RH	Station Press.	Precip.
Date	(EDST)		(°F)	(°F)	(°F)	(%)	(MB)	(")
31-Aug-02	21:00		68.8	70.4	68.0	87	30.36	0.00
31-Aug-02	22:00		67.7	68.4	67.2	92	30.35	0.00
31-Aug-02	23:00		68.3	69.0	67.6	87	30.35	0.00
31-Aug-02	23:59		66.8	67.7	66.0	87	30.34	0.00
01-Sep-02	1:00		65.3	66.5	64.5	88	30.33	0.02
01-Sep-02	2:00		63.9	65.6	62.5	91	30.31	0.03
01-Sep-02	3:00		62.4	63.0	62.0	96	30.29	0.05
01-Sep-02	4:00		61.6	62.3	60.9	96	30.27	0.15
01-Sep-02	5:00		61.2	61.5	60.8	97	30.26	0.11
01-Sep-02	6:00		61.3	61.6	61.0	97	30.25	0.09
01-Sep-02	7:00		61.1	61.5	60.7	97	30.26	0.09
01-Sep-02	8:00		60.9	61.4	60.7	96	30.26	0.05
01-Sep-02	9:00		61.5	62.0	60.9	96	30.25	0.10
01-Sep-02	10:00		62.1	62.8	61.5	97	30.25	0.11
01-Sep-02	11:00		63.4	64.5	62.3	96	30.23	0.02
01-Sep-02	12:00		64.5	65.0	64.0	96	30.21	0.02
01-Sep-02	13:00		64.5	65.1	64.0	96	30.20	0.04
01-Sep-02	14:00		65.6	66.6	64.6	95	30.20	0.02
01-Sep-02	15:00		66.8	67.2	66.0	95	30.18	0.00
01-Sep-02	16:00		67.2	67.6	66.6	95	30.15	0.02
01-Sep-02	17:00		67.7	68.2	67.2	95	30.13	0.00
01-Sep-02	18:00		67.7	68.2	67.3	95	30.13	0.00
01-Sep-02	19:00		68.0	68.4	67.6	94	30.12	0.00
01-Sep-02	20:00		67.9	68.3	67.5	94	30.11	0.00
01-Sep-02	21:00		67.7	68.1	67.2	92	30.11	0.00
01-Sep-02	22:00		67.2	67.7	66.9	92	30.12	0.00
01-Sep-02	23:00		66.8	67.2	66.4	91	30.11	0.00
01-Sep-02	23:59		66.3	66.9	65.8	91	30.10	0.00
02-Sep-02	1:00		66.3	66.6	65.9	91	30.10	0.00
02-Sep-02	2:00		66.0	66.4	65.6	91	30.09	0.00
02-Sep-02	3:00		65.7	66.0	65.2	91	30.07	0.00
02-Sep-02	4:00		65.3	65.8	64.9	91	30.05	0.00
02-Sep-02	5:00		65.1	65.4	64.7	90	30.04	0.00
02-Sep-02	6:00		64.9	65.2	64.6	91	30.05	0.00
02-Sep-02	7:00		64.9	65.2	64.6	91	30.06	0.00
02-Sep-02	8:00		64.9	65.3	64.6	90	30.07	0.00
02-Sep-02	9:00		65.7	66.7	64.9	88	30.07	0.00
02-Sep-02	10:00		67.5	69.0	66.1	84	30.06	0.00
02-Sep-02	11:00		69.5	71.0	68.3	80	30.05	0.00
02-Sep-02	12:00		71.1	72.3	70.2	78	30.04	0.00
02-Sep-02	13:00		72.4	74.1	71.0	76	30.02	0.00
02-Sep-02	14:00		73.7	74.8	72.8	73	30.01	0.00
02-Sep-02	15:00		75.1	76.6	74.2	71	29.99	0.00
02-Sep-02	16:00		75.2	76.4	74.4	72	29.97	0.00

TABLE B-1 CONT'D

DCP 7 Data from Phillips Airfield		Time	Avg Temp.	Max. Temp	Min. Temp	RH	Station Press.	Precip.
Date	(EDST)		(°F)	(°F)	(°F)	(%)	(MB)	(")
02-Sep-02	17:00		75.3	75.9	74.4	72	29.97	0.00
02-Sep-02	18:00		74.7	75.9	74.1	74	29.97	0.00
02-Sep-02	19:00		74.3	74.8	73.8	75	29.97	0.00
02-Sep-02	20:00		73.4	74.1	72.7	78	29.97	0.00
02-Sep-02	21:00		72.3	73.0	71.6	82	29.98	0.00
02-Sep-02	22:00		70.3	72.3	67.9	88	29.98	0.00
02-Sep-02	23:00		66.9	68.2	65.2	96	29.98	0.00
02-Sep-02	23:59		64.6	66.0	63.6	99	29.98	0.00
								2.67

## APPENDIX C. SOIL MOISTURE

### UXO SOIL MOISTURE PROBES DATA

DEPTH KEY: 1 = 1-6 inches, 2 = 6-12 inches, 3 = 12-24 inches  
4 = 24-36 inches, 5 = 36-48 inches

Rec#: 2

1. Item ID (Vender) ZONGE      2. Date: 08/19/2002

3. Start Time: 1018      4. Stop Time 1515

5. Data Collectors Name C WATSON / E WAGNER

----- REPEAT SECTION -----

	Morning % Moisture	Afternoon % Moisture
Wet Area	Time: 1018	Time: 1500
1	10.8	10.8
2	10.8	10.6
3	12.6	12.6
4	32.8	32.6
5	37.1	37.1
WOODED AREA	Time: 1026	Time: 1508
1	5.4	6.0
2	4.3	4.3
3	5.1	5.1
4	4.2	4.2
5	1.7	1.6
Open Field	Time: 1035	Time: 1515
1	3.7	3.3
2	4.6	4.3
3	2.1	2.2
4	5.1	4.8
5	0.1	0.2

-----  
UXO SOIL MOISTURE PROBES DATA

Rec#: 3

1. Item ID (Vender) ZONGE      2. Date: 08/20/2002

3. Start Time: 724      4. Stop Time 1617

5. Data Collectors Name C. WATSON

----- REPEAT SECTION -----

	Morning % Moisture	Afternoon % Moisture
Wet Area	Time: 930	Time: 1617
1	10.8	10.2
2	10.6	10.3
3	12.3	12.2
4	32.2	32.4
5	37.0	37.1
WOODED AREA	Time: 732	Time: 1610
1	6.0	5.4
2	4.0	4.0
3	4.9	4.9
4	4.4	4.1
5	1.6	1.7
Open Field	Time: 724	Time: 1600
1	4.0	4.0
2	4.3	4.3
3	1.8	1.3
4	4.8	1.5
5	0.5	0.1

----- UXO SOIL MOISTURE PROBES DATA -----

Rec#: 4

1. Item ID (Vender) ZONGE      2. Date: 08/21/2002  
3. Start Time: 713      4. Stop Time 1520  
5. Data Collectors Name C. WATSON

----- REPEAT SECTION -----

	Morning % Moisture	Afternoon % Moisture
Wet Area	Time: 730	Time: 1530
1	10.5	10.5
2	10.3	10.0
3	12.2	11.9
4	32.4	32.4
5	36.7	37.0
WOODED AREA	Time: 722	Time: 1510
1	5.7	5.7

2	4.0	4.0
3	4.9	5.2
4	4.5	4.4
5	1.7	1.7

Open Field      Time:      713      Time:      1500

1	3.7	3.7
2	5.4	4.3
3	2.0	2.1
4	1.4	5.1
5	0.5	0.2

-----  
UXO SOIL MOISTURE PROBES DATA

Rec#:      5

1. Item ID (Vender)	ZONGE	2. Date:	08/22/2002
3. Start Time:	750	4. Stop Time	1458
5. Data Collectors Name	C. WATSON		

----- REPEAT SECTION -----

Wet Area	Morning	Afternoon
	% Moisture	% Moisture
Time: 807		Time: 1458
1	10.0	10.8
2	10.0	9.7
3	11.6	11.9
4	31.8	31.8
5	37.0	37.0

WOODED AREA	Time: 759	Time: 1450
1	6.0	5.4
2	4.0	3.7
3	5.1	4.9
4	4.4	4.2
5	1.7	1.9

Open Field	Time: 750	Time: 1440
1	3.4	4.0
2	4.3	4.3
3	2.1	1.5
4	4.9	1.5
5	0.2	0.4

-----  
UXO SOIL MOISTURE PROBES DATA

Rec#:      6

1. Item ID (Vender) ZONGE                    2. Date: 08/23/2002  
3. Start Time: 720                          4. Stop Time 1427  
5. Data Collectors Name C. WATSON

----- REPEAT SECTION -----

	Morning % Moisture	Afternoon % Moisture
Wet Area	Time: 739	Time: 1427
1	11.9	11.4
2	9.1	9.1
3	11.3	11.8
4	31.7	31.8
5	36.8	37.0
WOODED AREA	Time: 730	Time: 1420
1	6.0	5.7
2	4.0	3.4
3	4.9	4.9
4	4.4	4.5
5	1.9	1.9
Open Field	Time: 720	Time: 1408
1	5.1	4.3
2	4.0	3.7
3	1.8	1.9
4	2.1	4.8
5	0.4	0.1

-----  
UXO SOIL MOISTURE PROBES DATA

Rec#: 10

1. Item ID (Vender) ZONGE                    2. Date: 08/25/2002  
3. Start Time: 721                          4. Stop Time 1436  
5. Data Collectors Name E. WAGONER

----- REPEAT SECTION -----

	Morning % Moisture	Afternoon % Moisture
Wet Area	Time: 740	Time: 1436
1	24.7	21.6
2	9.1	9.7
3	11.8	11.0

4	31.4	18.0
5	36.7	28.7

WOODED AREA	Time: 732	Time: 1429
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1	18.5	14.2
2	14.5	12.3
3	16.0	13.0
4	4.1	4.2
5	2.3	2.2

Open Field	Time: 721	Time: 1419
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1	18.8	15.6
2	2.3	3.1
3	1.9	1.9
4	5.2	5.1
5	0.0	0.1

#### UXO SOIL MOISTURE PROBES DATA

Rec#: 19

1. Item ID (Vender) ZONGE      2. Date: 08/26/2002

3. Start Time: 737      4. Stop Time 1438

5. Data Collectors Name C. WATSON

#### ----- REPEAT SECTION -----

	Morning % Moisture	Afternoon % Moisture
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Wet Area	Time: 753	Time: 1438
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1	19.0	17.9
2	10.0	10.8
3	11.6	11.6
4	31.7	31.3
5	36.7	37.0

WOODED AREA	Time: 745	Time: 1432
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1	13.1	10.0
2	10.8	10.8
3	10.7	10.0
4	4.5	4.1
5	2.0	2.4

Open Field	Time: 737	Time: 1423
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1	13.4	11.1
2	4.3	4.8
3	2.2	1.8
4	4.8	4.9

5 0.1 0.0

-----  
UXO SOIL MOISTURE PROBES DATA

Rec#: 20

1. Item ID (Vender) ZONGE 2. Date: 08/27/2002  
3. Start Time: 730 4. Stop Time 1500  
5. Data Collectors Name C. WATSON

----- REPEAT SECTION -----

	Morning % Moisture	Afternoon % Moisture
Wet Area	Time: 730	Time: 1440
1	10.8	10.8
2	4.3	4.3
3	1.8	1.8
4	4.8	4.8
5	0.1	0.1
WOODED AREA	Time: 740	Time: 1450
1	10.5	10.3
2	9.7	9.4
3	8.4	8.7
4	4.4	4.1
5	2.0	1.9
Open Field	Time: 750	Time: 1500
1	17.3	16.8
2	10.6	11.0
3	11.6	11.9
4	31.4	31.5
5	36.6	36.6

-----  
UXO SOIL MOISTURE PROBES DATA

Rec#: 29

1. Item ID (Vender) ZONGE 2. Date: 08/28/2002  
3. Start Time: 745 4. Stop Time 1449  
5. Data Collectors Name C. WATSON

----- REPEAT SECTION -----

Morning % Moisture	Afternoon % Moisture
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Wet Area	Time:	815	Time:	1449
1		17.1		20.8
2		10.6		9.7
3		11.5		11.6
4		31.1		31.4
5		36.3		36.7
WOODED AREA	Time:	800	Time:	1442
1		13.2		10.0
2		10.9		8.3
3		7.6		7.4
4		4.5		4.5
5		2.3		2.0
Open Field	Time:	745	Time:	1435
1		19.1		12.8
2		10.2		4.3
3		2.1		1.8
4		4.8		4.8
5		0.2		0.0

-----  
UXO SOIL MOISTURE PROBES DATA

Rec#: 30

1. Item ID (Vender)	ZONGE	2. Date:	08/29/2002
3. Start Time:	719	4. Stop Time	1429
5. Data Collectors Name	C. WATSON		

----- REPEAT SECTION -----

	Morning % Moisture	Afternoon % Moisture
Wet Area	Time: 734	Time: 1429
1	34.1	32.7
2	12.3	13.4
3	11.5	12.3
4	31.4	31.4
5	36.7	36.4
WOODED AREA	Time: 726	Time: 1422
1	33.8	30.7
2	29.1	16.5
3	46.6	40.9
4	3.3	4.1
5	4.9	3.1

Open Field	Time:	719	Time:	1412
1		27.3		23.3
2		8.6		8.0
3		1.6		1.6
4		5.2		4.9
5		0.0		0.1

-----  
UXO SOIL MOISTURE PROBES DATA

Rec#: 31

1. Item ID (Vender)	ZONGE	2. Date:	08/30/2002
3. Start Time:	720	4. Stop Time	1340
5. Data Collectors Name	C. WATSON		

----- REPEAT SECTION -----

Wet Area	Morning	Afternoon	
	% Moisture	% Moisture	
Time:	740	Time:	1340
1	29.0	27.3	
2	14.5	15.1	
3	12.3	12.3	
4	31.1	31.7	
5	36.4	36.6	
WOODED AREA	Time: 730	Time: 1330	
1	25.0	22.7	
2	13.4	12.3	
3	26.1	24.2	
4	4.0	4.2	
5	2.3	2.7	
Open Field	Time: 720	Time: 1320	
1	18.5	17.1	
2	7.4	7.4	
3	1.9	1.6	
4	5.1	4.8	
5	0.1	0.2	

-----  
UXO SOIL MOISTURE PROBES DATA

Rec#: 32

1. Item ID (Vender)	ZONGE	2. Date:	08/31/2002
3. Start Time:	707	4. Stop Time	1349

5. Data Collectors Name C. WATSON

----- REPEAT SECTION -----

	Morning % Moisture	Afternoon % Moisture
Wet Area	Time: 725	Time: 1349
1	25.0	22.2
2	14.8	15.1
3	12.5	12.6
4	30.9	4.5
5	36.4	4.6
WOODED AREA	Time: 715	Time: 1342
1	20.5	18.2
2	11.4	10.8
3	22.1	21.2
4	4.1	4.0
5	2.4	2.4
Open Field	Time: 707	Time: 1434
1	16.5	14.2
2	8.3	8.0
3	1.8	1.9
4	4.9	4.8
5	0.4	0.1

----- UXO SOIL MOISTURE PROBES DATA -----

Rec#: 33

1. Item ID (Vender) ZONGE      2. Date: 09/01/2002  
3. Start Time: 723      4. Stop Time 1255  
5. Data Collectors Name C. WATSON

----- REPEAT SECTION -----

	Morning % Moisture	Afternoon % Moisture
Wet Area	Time: 750	Time: 1245
1	33.8	37.2
2	17.4	20.8
3	13.9	17.8
4	31.7	71.8
5	36.4	36.0
WOODED AREA	Time: 740	Time: 1255

1	39.5	45.7
2	65.1	65.6
3	33.8	33.8
4	4.0	4.1
5	2.6	2.6

Open Field	Time: 723	Time: 1235
1	37.7	33.8
2	14.3	20.8
3	1.9	2.2
4	4.9	4.8
5	0.2	0.2

#### UXO SOIL MOISTURE PROBES DATA

Rec#: 34

1. Item ID (Vender)	ZONGE	2. Date:	09/02/2002
3. Start Time:	817	4. Stop Time	834
5. Data Collectors Name	C. WATSON		

#### ----- REPEAT SECTION -----

Wet Area	Morning % Moisture	Afternoon % Moisture
	Time: 834	Time: 0
1	33.3	0.0
2	22.8	0.0
3	18.6	0.0
4	34.3	0.0
5	37.4	0.0
WOODED AREA	Time: 826	Time: 0
1	27.3	0.0
2	29.6	0.0
3	35.0	0.0
4	4.5	0.0
5	2.3	0.0
Open Field	Time: 817	Time: 0
1	25.9	0.0
2	16.3	0.0
3	0.0	0.0
4	5.1	0.0
5	0.1	0.0

#### UXO SOIL MOISTURE PROBES DATA

## **APPENDIX D. DAILY LOGS**

## APPENDIX D. DAILY LOGS

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration min.	Operational Status	Operational Status - Comments	Track Method	Track Method=Other Explain	Pattern	Field Conditions	No. of People
20020819	3.00	NA	700	1150	290	INITIAL SET-UP	SET- UP/MOBILIZATION	GPS	NA	NA	HOT/HUMID	DRY 3
20020819	3.00	CALIBRATION LANES	1150	1205	15	COLLECTING DATA		GPS	NA	LINEAR	HOT/HUMID	DRY 3
20020819	3.00	CALIBRATION LANES	1205	1255	50	DOWNTIME DUE TO EQUIP MAINT/CHECK	VERIFIED DATA WAS BEING RECORDED	GPS	NA	NA	HOT/HUMID	DRY 3
20020819	3.00	CALIBRATION LANES	1255	1325	30	COLLECTING DATA		GPS	NA	LINEAR	HOT/HUMID	DRY 3
20020819	3.00	CALIBRATION LANES	1325	1451	86	DOWNTIME DUE TO EQUIP MAINT/CHECK	THE DATA WAS DOWNLOADED TO VERIFY THE GPS WAS FUNCTIONING	GPS	NA	NA	HOT/HUMID	DRY 3
20020819	3.00	CALIBRATION LANES	1451	1621	90	COLLECTING DATA		GPS	NA	LINEAR	HOT/HUMID	DRY 3
20020820	3.00	BLIND TEST GRID	700	805	65	DAILY START, STOP	START OF DAILY OPERATIONS / EQUIPMENT PREPARATIONS	OTHER	NA	NA	HOT/HUMID	DRY 3
20020820	3.00	BLIND TEST GRID	805	1014	129	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT/HUMID	DRY 3
20020820	3.00	OPEN FIELD	1014	1035	21	DOWNTIME DUE TO EQUIP MAINT/CHECK	CHANGED BATTERIES OTHER	NA	NA	NA	HOT/HUMID	DRY 3
20020820	3.00	OPEN FIELD	1035	1113	38	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES	LINEAR	HOT/HUMID	DRY 3
20020820	3.00	MINE GRID	1113	1135	22	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES	LINEAR	HOT/HUMID	DRY 3
20020820	3.00	OPEN FIELD	1135	1200	25	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	OTHER	NA	NA	HOT/HUMID	DRY 3
20020820	3.00	OPEN FIELD	1200	1306	66	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT/HUMID	DRY 3
20020820	3.00	OPEN FIELD	1306	1341	35	BREAK/LUNCH	BREAK	OTHER	NA	NA	HOT/HUMID	DRY 3

TABLE D-1 CONT'D

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration min.	Operational Status	Operational Comments	Track Method	Method=Other Explain	Pattern	Field Conditions	No. of People
20020820	3.00	OPEN FIELD	1341	1655	194	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT/HUMID	DRY
20020820	3.00	OPEN FIELD	1655	1715	20	DAILY START, STOP	END OF DAILY OPERATIONS / EQUIPMENT BREAKDOWN	OTHER	NA	NA	HOT/HUMID	DRY
20020821	3.00	OPEN FIELD	700	802	62	DAILY START, STOP	START OF DAILY OPERATIONS / EQUIPMENT PREPARATIONS	NA	NA	NA	HOT/HUMID	DRY
20020821	3.00	OPEN FIELD	802	850	48	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	GPS	NA	LINEAR	HOT/HUMID	DRY
20020821	3.00	OPEN FIELD	850	930	40	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	GPS	NA	NA	HOT/HUMID	DRY
20020821	3.00	OPEN FIELD	930	935	5	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	GPS	NA	NA	HOT/HUMID	DRY
20020821	3.00	OPEN FIELD	935	16	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT/HUMID	DRY	
20020821	3.00	OPEN FIELD	951	1030	39	BREAK/LUNCH COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	BREAK	NA	NA	HOT/HUMID	DRY
20020821	3.00	OPEN FIELD	1030	1120	50	BREAK/LUNCH COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT/HUMID	DRY
20020821	3.00	OPEN FIELD	1120	1150	30	BREAK/LUNCH COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	LUNCH	NA	NA	HOT/HUMID	DRY
20020821	3.00	OPEN FIELD	1150	1240	50	BREAK/LUNCH COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT/HUMID	DRY
20020821	3.00	OPEN FIELD	1240	1300	20	BREAK/LUNCH DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	BREAK	NA	NA	HOT/HUMID	DRY
20020821	3.00	OPEN FIELD	1300	1340	40	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	HOT/HUMID	DRY
20020821	3.00	OPEN FIELD	1340	1350	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	NA	NA	NA	NA	HOT/HUMID	DRY

TABLE D-1 CONT'D

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration min.	Operational Status	Operational Status - Comments	Track Method	Track Method=Other Explain	Pattern	Field Conditions	No. of People
20020821	3.00	OPEN FIELD	1350	1455	65	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES	LINEAR	HOT/HUMID	DRY 3
20020821	3.00	OPEN FIELD	1455	1530	35	DAILY START, STOP	END OF DAILY OPERATION/ EQUIPMENT BREAKDOWN	NA	NA	NA	HOT/HUMID	DRY 3
20020822	3.00	OPEN FIELD	700	810	70	DAILY START, STOP	START OF DAILY OPERATIONS/ EQUIPMENT PREPARATIONS	NA	NA	NA	HOT/HUMID	DRY 3
20020822	3.00	OPEN FIELD	810	930	80	COLLECTING DATA	EQUIPMENT WAS CALIBRATED AFTER DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT/HUMID	DRY 3
20020822	3.00	OPEN FIELD	930	940	10	BREAK/LUNCH	BREAK	NA	NA	NA	HOT/HUMID	DRY 3
20020822	3.00	OPEN FIELD	940	950	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	HOT/HUMID	DRY 3
20020822	3.00	OPEN FIELD	950	1050	60	COLLECTING DATA	EQUIPMENT WAS CALIBRATED AFTER DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT/HUMID	DRY 3
20020822	3.00	OPEN FIELD	1050	1112	22	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	HOT/HUMID	DRY 3
20020822	3.00	OPEN FIELD	1112	1120	8	DOWNTIME DUE TO EQUIP MAINT/CHECK	CHANGED BATTERIES	NA	NA	NA	HOT/HUMID	DRY 3
20020822	3.00	OPEN FIELD	1120	1230	70	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT/HUMID	DRY 3
20020822	3.00	OPEN FIELD	1230	1235	5	DOWNTIME DUE TO EQUIP MAINT/CHECK	THE SOFTWARE WAS RESET	NA	NA	NA	HOT/HUMID	DRY 3
20020822	3.00	OPEN FIELD	1235	1250	15	BREAK/LUNCH	LUNCH	NA	NA	NA	HOT/HUMID	DRY 3
20020822	3.00	OPEN FIELD	1250	1305	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	HOT/HUMID	DRY 3
20020822	3.00	OPEN FIELD	1305	1315	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	HOT/HUMID	DRY 3

TABLE D-1 CONT'D

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration min.	Operational Status	Operational Comments	Track Method	Track Method Explain	Pattern	Field Conditions	No. of People
20020822	3.00	OPEN FIELD	1315	1408	53	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT/HUMID	DRY
20020822	3.00	OPEN FIELD	1408	1415	7	DOWNTIME DUE TO EQUIPMENT FAILURE	WHEEL YOKE SUPPORT WAS REINFORCED USING TAPE AND A WOODEN STICK	NA	NA	NA	HOT/HUMID	DRY
20020822	3.00	OPEN FIELD	1415	1430	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	HOT/HUMID	DRY
20020822	3.00	OPEN FIELD	1430	1436	6	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	HOT/HUMID	DRY
20020822	3.00	OPEN FIELD	1436	1540	64	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT/HUMID	DRY
20020822	3.00	OPEN FIELD	1540	1550	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	HOT/HUMID	DRY
20020822	3.00	OPEN FIELD	1550	1605	15	DAILY START, STOP	END OF DAILY OPERATIONS / EQUIPMENT BREAK DOWN	NA	NA	NA	HOT/HUMID	DRY
20020823	3.00	OPEN FIELD	700	810	70	DAILY START, STOP	START OF DAILY OPERATIONS / EQUIPMENT PREPARATIONS	NA	NA	NA	HOT/HUMID	DRY
20020823	3.00	OPEN FIELD	810	830	20	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT/HUMID	WET
20020823	3.00	OPEN FIELD	830	930	60	DOWNTIME DUE TO EQUIPMENT FAILURE	UNABLE TO KEEP LOCK ON GPS DUE TO BASE RECEIVER FAILURE	NA	NA	NA	HOT/HUMID	DRY
20020823	3.00	OPEN FIELD	930	1030	60	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT/HUMID	WET

TABLE D-1 CONT'D

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration min.	Operational Status	Operational Status - Comments	Track Method	Method=Other Explain	Pattern	Field Conditions	No. of People
20020823	3.00	OPEN FIELD	1030	1140	70	DOWNTIME DUE TO EQUIPMENT FAILURE	UNABLE TO KEEP LOCK ON GPS DUE TO BASE RECEIVER FAILURE	NA	NA	HOT/HUMID	DRY	3
20020823	3.00	OPEN FIELD	1140	1150	10	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	TAPES / STAKES	LINEAR	HOT/HUMID	DRY	3
20020823	3.00	OPEN FIELD	1150	1210	20	DOWNTIME DUE TO EQUIPMENT FAILURE	UNABLE TO KEEP LOCK ON GPS DUE TO BASE RECEIVER FAILURE	NA	NA	HOT/HUMID	DRY	3
20020823	3.00	OPEN FIELD	1210	1241	31	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	TAPES / STAKES	LINEAR	HOT/HUMID	DRY	3
20020823	3.00	OPEN FIELD	1241	1315	34	DOWNTIME DUE TO EQUIPMENT FAILURE	UNABLE TO KEEP LOCK ON GPS DUE TO BASE RECEIVER FAILURE	NA	NA	HOT/HUMID	DRY	3
20020823	3.00	OPEN FIELD	1315	1325	10	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	TAPES / STAKES	LINEAR	HOT/HUMID	DRY	3
20020823	3.00	OPEN FIELD	1325	1350	25	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	HOT/HUMID	DRY	3
20020823	3.00	OPEN FIELD	1350	1400	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	HOT/HUMID	DRY	3
20020823	3.00	OPEN FIELD	1400	1545	105	DOWNTIME DUE TO EQUIPMENT FAILURE	UNABLE TO KEEP LOCK ON GPS DUE TO BASE RECEIVER FAILURE	NA	NA	HOT/HUMID	DRY	3
20020823	3.00	OPEN FIELD	1545	1600	15	DAILY START, STOP	END OF DAILY OPERATIONS / EQUIPMENT BREAKDOWN	NA	NA	HOT/HUMID	DRY	3
20020824	3.00	OPEN FIELD	1600	1700	60	DAILY START, STOP	START OF DAILY OPERATIONS / EQUIPMENT PREPARATIONS	NA	NA	HOT/HUMID	WET	3

TABLE D-1 CONT'D

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration min.	Operational Status	Status - Comments	Operational Status	Track Method	Method Explain	Track Pattern	Field Conditions	No. of People
20020824	3.00	OPEN FIELD	1700	1800	60	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT/HUMID	WET	3
20020824	3.00	OPEN FIELD	1800	1815	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	HOT/HUMID	WET	3
20020824	3.00	OPEN FIELD	1815	1830	15	DAILY START, STOP	END OF DAILY OPERATIONS / EQUIPMENT BREAKDOWN	NA	NA	NA	HOT/HUMID	WET	3
20020825	3.00	OPEN FIELD	700	741	41	DAILY START, STOP	START OF DAILY OPERATIONS / EQUIPMENT PREPARATIONS	NA	NA	NA	CLEAR/UNLIMITED	WET	3
20020825	3.00	OPEN FIELD	741	841	60	COLLECTING DATA	EQUIPMENT WAS CALIBRATED USING GPS BEFORE DATA RUN	OTHER	TAPES / STAKES	LINEAR/CLEAR/UNLIMITED	WET	3	
20020825	3.00	OPEN FIELD	841	849	8	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	NA	3
20020825	3.00	OPEN FIELD	849	858	9	BREAK/LUNCH	BREAK	NA	NA	NA	CLEAR/UNLIMITED	WET	3
20020825	3.00	OPEN FIELD	858	1002	64	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT	WET	3
20020825	3.00	OPEN FIELD	1002	1017	15	BREAK/LUNCH	BREAK	NA	NA	NA	NA	NA	3
20020825	3.00	OPEN FIELD	1017	1027	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	NA	3
20020825	3.00	OPEN FIELD	1027	1141	74	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT	WET	3
20020825	3.00	OPEN FIELD	1141	1146	5	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	NA	3
20020825	3.00	OPEN FIELD	1146	1206	20	BREAK/LUNCH	LUNCH	NA	NA	NA	NA	NA	3
20020825	3.00	OPEN FIELD	1206	1241	35	DOWNTIME DUE TO EQUIP MAINT/CHECK	CHANGED BATTERIES	NA	NA	NA	HOT/HUMID	NA	3

TABLE D-1 CONT'D

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration min.	Operational Status	Operational Status - Comments	Track Method	Track Method=Other Explain	Pattern	Field Conditions	No. of People
20020825	3.00	OPEN FIELD	1241	1313	32	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT/HUMID	DRY 3
20020825	3.00	OPEN FIELD	1313	1318	5	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	NA 3
20020825	3.00	OPEN FIELD	1318	1336	18	DOWNTIME DUE BREAK/LUNCH	BREAK	NA	NA	NA	NA	NA 3
20020825	3.00	OPEN FIELD	1336	1350	14	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	NA 3
20020825	3.00	OPEN FIELD	1350	1433	43	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT/HUMID	DRY 3
20020825	3.00	OPEN FIELD	1433	1449	16	DOWNTIME DUE TO EQUIPMENT FAILURE	LEFT BRACE SUPPORT FOR ANTENNA ASSEMBLY BROKE	NA	NA	NA	NA	NA 3
20020825	3.00	OPEN FIELD	1449	1457	8	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	NA 3
20020825	3.00	OPEN FIELD	1457	1504	7	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	NA 3
20020825	3.00	OPEN FIELD	1504	1805	61	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	OTHER	TAPES / STAKES	LINEAR	HOT/HUMID	DRY 3
20020825	3.00	OPEN FIELD	1805	1815	10	DAILY START, STOP	END OF DAILY OPERATIONS / EQUIPMENT BREAKDOWN	NA	NA	NA	NA	NA 3
20020826	3.00	OPEN FIELD	700	730	30	DÉMONSTRATION SITE ISSUE	SECURITY BADGES NEED TO BE RENEWED	NA	NA	NA	NA	NA 3
20020826	3.00	OPEN FIELD	730	815	45	DAILY START, STOP	START OF DAILY OPERATIONS / EQUIPMENT PREPARATIONS	NA	NA	NA	NA	NA 3
20020826	3.00	OPEN FIELD	815	940	85	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE RUN USING CAL BALL	CONES	TAPES	LINEAR	NA	NA 3

TABLE D-1 CONT'D

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration min.	Operational Status	Operational Status - Comments	Track Method	Track Method-Other Explain	Pattern	Field Conditions	No. of People
20020826	3.00	OPEN FIELD	940	950	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	3
20020826	3.00	OPEN FIELD	950	1000	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	3
20020826	3.00	OPEN FIELD	1000	1050	50	DOWNTIME DUE TO EQUIP MAINT/CHECK	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	TAPES	LINEAR	HOT/HUMID	DRY
20020826	3.00	OPEN FIELD	1050	1110	20	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	3
20020826	3.00	OPEN FIELD	1110	1125	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	CHANGED BATTERIES	NA	NA	NA	NA	3
20020826	3.00	OPEN FIELD	1125	1230	65	DOWNTIME DUE TO EQUIP MAINT/CHECK	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	TAPES	LINEAR	HOT/HUMID	NA
20020826	3.00	OPEN FIELD	1230	1240	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	BREAK/LUNCH	DOWNLOADING DATA	NA	NA	NA	NA
20020826	3.00	OPEN FIELD	1240	1300	20	DOWNTIME DUE TO EQUIP MAINT/CHECK	LUNCH	NA	NA	NA	NA	3
20020826	3.00	OPEN FIELD	1300	1310	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	3
20020826	3.00	OPEN FIELD	1310	1410	60	DOWNTIME DUE TO EQUIP MAINT/CHECK	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	TAPES	LINEAR	HOT/HUMID	DRY
20020826	3.00	OPEN FIELD	1410	1420	10	BREAK/LUNCH	BREAK	NA	NA	NA	NA	3
20020826	3.00	OPEN FIELD	1420	1430	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	3
20020826	3.00	OPEN FIELD	1430	1440	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	3
20020826	3.00	OPEN FIELD	1440	1550	70	DOWNTIME DUE TO EQUIP MAINT/CHECK	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	TAPES	LINEAR	HOT/HUMID	DRY

TABLE D-1 CONT'D

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration min.	Operational Status	Operational Status - Comments	Track Method	Track Method=Other Explain	Pattern	Field Conditions	No. of People
20020826	3.00	OPEN FIELD	1550	1610	20	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	3
20020826	3.00	OPEN FIELD	1610	1620	10	DAILY START, STOP	END OF DAILY OPERATIONS / EQUIPMENT BREAKDOWN	NA	NA	NA	NA	3
20020827	3.00	OPEN FIELD	700	729	29	DAILY START, STOP	START OF DAILY OPERATIONS / EQUIPMENT PREPARATIONS	NA	NA	NA	NA	3
20020827	3.00	OPEN FIELD	729	845	76	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	CONEs	TAPES	LINEAR	HOT/HUMID	DRY
20020827	3.00	OPEN FIELD	845	900	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	3
20020827	3.00	OPEN FIELD	900	905	5	BREAK/LUNCH	BREAK	NA	NA	NA	NA	3
20020827	3.00	OPEN FIELD	905	915	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	3
20020827	3.00	OPEN FIELD	915	1010	55	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	CONEs	TAPES	LINEAR	HOT/HUMID	DRY
20020827	3.00	OPEN FIELD	1010	1020	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	3
20020827	3.00	OPEN FIELD	1020	1040	20	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	3
20020827	3.00	OPEN FIELD	1040	1125	45	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	CONEs	TAPES	LINEAR	HOT/HUMID	DRY
20020827	3.00	OPEN FIELD	1125	1135	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	3
20020827	3.00	OPEN FIELD	1135	1155	20	BREAK/LUNCH	LUNCH	NA	NA	NA	NA	3
20020827	3.00	OPEN FIELD	1155	1210	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	3

TABLE D-1 CONT'D

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration min.	Operational Status	Operational Status - Comments	Track Method	Track Method=Other Explain	Pattern	Field Conditions	No. of People	
20020827	3.00	OPEN FIELD	1210	1300	50	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	CONES	TAPES	LINEAR	HOT/HUMID	DRY 3	
20020827	3.00	OPEN FIELD	1300	1320	20	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	NA 3	
20020827	3.00	OPEN FIELD	1320	1340	20	DOWNTIME DUE TO EQUIP MAINT/CHECK	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	CONES	TAPES	LINEAR	HOT/HUMID	DRY 3
20020827	3.00	OPEN FIELD	1340	1440	60	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	NA 3	
20020827	3.00	OPEN FIELD	1440	1450	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	CONES	TAPES	LINEAR	HOT/HUMID	DRY 3
20020827	3.00	OPEN FIELD	1450	1500	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	HOT/HUMID	DRY 3	
20020827	3.00	OPEN FIELD	1500	1535	35	DOWNTIME DUE TO EQUIP FAILURE	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	GPS COMMUNICATIONS	NA	NA	HOT/HUMID	DRY 3
20020827	3.00	OPEN FIELD	1535	1540	5	DOWNTIME DUE TO EQUIP FAILURE	COLLECTING DATA	RESTART AFTER FAILURE TO COMMUNICATE WITH GPS	CONES	TAPES	LINEAR	HOT/HUMID	DRY 3
20020827	3.00	OPEN FIELD	1604	1604	24	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	NA 3	
20020827	3.00	OPEN FIELD	1610	1620	10	DAILY START, STOP	END OF DAILY OPERATIONS / EQUIPMENT BREAKDOWN	NA	NA	NA	NA	NA 3	
20020828	4.00	OPEN FIELD	700	815	75	DAILY START, STOP	START OF DAILY OPERATIONS / EQUIPMENT PREPARATIONS	NA	NA	NA	NA	4	

TABLE D-1 CONT'D

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration min.	Operational Status	Operational Status - Comments	Track Method CONES	Track Method CONES	Track Method TAPES	Method=Other Explain	Pattam.	Field Conditions RAIN/LIMITED	Field Conditions RAIN/LIMITED	No. of People WET
20020828	4.00	OPEN FIELD	815	920	65	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL								4
20020828	4.00	OPEN FIELD	920	930	10	DOWNTIME DUE TO EQUIP MAINT/CHECK WEATHER ISSUE	MAINT/CHECK WEATHER ISSUE	DOWNLOADING DATA	NA	NA	NA	NA	NA	NA	4
20020828	4.00	OPEN FIELD	930	945	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	NA	NA	NA	4
20020828	4.00	OPEN FIELD	945	950	5	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL								4
20020828	4.00	OPEN FIELD	950	1050	60	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL								4
20020828	4.00	OPEN FIELD	1050	1100	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	NA	NA	4
20020828	4.00	OPEN FIELD	1100	1115	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	NA	NA	NA	4
20020828	4.00	OPEN FIELD	1115	1215	60	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL								4
20020828	4.00	OPEN FIELD	1215	1225	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	CHANGED BATTERIES	NA	NA	NA	NA	NA	NA	NA	4
20020828	4.00	OPEN FIELD	1225	1330	65	DOWNTIME DUE TO EQUIP MAINT/CHECK	ROUTINE CHECK OF BASE RADIO RECEIVER / NEED NEW BATTERY	NA	NA	NA	NA	NA	NA	NA	4
20020828	4.00	OPEN FIELD	1330	1340	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	NA	NA	NA	4
20020828	4.00	OPEN FIELD	1340	1445	65	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL								4
20020828	4.00	OPEN FIELD	1445	1500	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	NA	NA	NA	4

TABLE D-1 CONT'D

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration min.	Operational Status	Operational Status . Comments	Track Method	Track Method=Other Explain	Pattern	Field Conditions	No. of People
20020828	4.00	OPEN FIELD	1500	1515	15	DAILY START, STOP	END OF DAILY OPERATIONS / EQUIPMENT BREAKDOWN	NA	NA	NA	NA	4
20020829	4.00	OPEN FIELD	700	800	60	DAILY START, STOP	START OF DAILY OPERATIONS / EQUIPMENT PREPARATIONS	NA	NA	NA	NA	4
20020829	4.00	OPEN FIELD	800	810	10	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	CONES	STAKES	LINEAR	RAIN/LIMITED	WET
20020829	4.00	OPEN FIELD	810	910	60	DOWNTIME DUE TO EQUIPMENT FAILURE	STRESS CRACK ON WHEEL YOKE BASE BRACKET; REPAIRED	NA	NA	NA	NA	4
20020829	4.00	OPEN FIELD	910	925	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	NO DATA WAS DOWNLOADED	NA	NA	NA	NA	4
20020829	4.00	OPEN FIELD	925	1030	65	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	CONES	STAKES	LINEAR	RAIN & HAZE/LIMITED	WET
20020829	4.00	OPEN FIELD	1030	1050	20	DOWNTIME DUE TO EQUIP MAINT/CHECK	NO DATA WAS DOWNLOADED	NA	NA	NA	NA	4
20020829	4.00	OPEN FIELD	1050	1130	40	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	CONES	STAKES	LINEAR	RAIN & HAZE/LIMITED	WET
20020829	4.00	OPEN FIELD	1130	1150	20	DOWNTIME DUE TO EQUIP MAINT/CHECK	EQUIPMENT DATA	NA	NA	NA	NA	4
20020829	4.00	OPEN FIELD	1150	1215	25	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN / RESUMED TESTING	CONES	STAKES	LINEAR	RAIN & HAZE/LIMITED	WET
20020829	4.00	OPEN FIELD	1215	1230	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	CHANGED BATTERIES	NA	NA	NA	HOT/HUMID	NA
20020829	4.00	OPEN FIELD	1230	1240	10	BREAK/LUNCH	LUNCH	NA	NA	NA	NA	4
20020829	4.00	OPEN FIELD	1240	1250	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	4

TABLE D-1 CONT'D

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration min.	Operational Status	Operational Status - Comments	Track Method	Track Method=Other Explain	Pattern	Field Conditions	No. of People
20020829	4.00	OPEN FIELD	1250	1350	60	COLLECTING DATA	EQUIPMENT WAS DOWNLOADED BEFORE RUN / START OF NEW GRID	CONES	TAPES	LINEAR	RAIN & HAZE/LIMITED	WET 4
20020829	- 4.00	OPEN FIELD	1350	1405	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	NO DATA WAS DOWNLOADED	NA	NA	NA	NA	NA 4
20020829	- 4.00	OPEN FIELD	1405	1505	60	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	CONES	TAPES	LINEAR	RAIN & HAZE/LIMITED	WET 4
20020829	- 4.00	OPEN FIELD	1505	1540	35	DOWNTIME DUE TO EQUIP MAINT/CHECK	NO DATA DOWNLOADED	NA	NA	NA	NA	NA 4
20020829	- 4.00	OPEN FIELD	1540	1640	60	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	CONES	TAPES	LINEAR	RAIN & HAZE/LIMITED	WET 4
20020829	- 4.00	OPEN FIELD	1640	1650	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	NA 4
20020829	- 4.00	OPEN FIELD	1650	1700	10	DAILY START, STOP	END OF DAILY OPERATIONS / EQUIPMENT BREAKDOWN	NA	NA	NA	NA	NA 4
20020830	- 4.00	OPEN FIELD	700	925	145	DAILY START, STOP	START OF DAILY OPERATIONS / EQUIPMENT PREPARATIONS	NA	NA	NA	NA	NA 4
20020830	- 4.00	OPEN FIELD	925	1025	60	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	CONES	TAPES	LINEAR CLEAR UNLIMITED	WET	4
20020830	- 4.00	OPEN FIELD	1025	1040	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	EQUIPMENT CHECK / NO DATA WAS DOWNLOADED	NA	NA	NA	NA	NA 4
20020830	- 4.00	OPEN FIELD	1040	1055	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	NA 4
20020830	- 4.00	OPEN FIELD	1055	1155	60	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	CONES	TAPES	LINEAR CLEAR UNLIMITED	WET	4

TABLE D-1 CONT'D

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration min.	Operational Status	Operational Status - Comments	Track Method	Track Method-Other Explain	Other Pattern	Field Conditions	No. of People
20020830	4.00	OPEN FIELD	1155	1215	20	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	4
20020830	4.00	OPEN FIELD	1215	1225	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	CHANGED BATTERIES	NA	NA	NA	NA	4
20020830	4.00	OPEN FIELD	1225	1325	60	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	TAPES	CONES	LINEAR CLEAR/UNLIMITED	WET	4
20020830	4.00	OPEN FIELD	1325	1338	13	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	4
20020830	4.00	OPEN FIELD	1338	1345	7	DOWNTIME DUE TO EQUIPMENT FAILURE	LEFT SIDE WHEEL YOKE ASSY BASE CRACKED/ REPAIRED WITH EPOXY	NA	NA	NA	NA	4
20020830	4.00	OPEN FIELD	1345	1351	6	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	4
20020830	4.00	OPEN FIELD	1351	1500	69	COLLECTING DATA	EQUIPMENT CALIBRATED/SECOND PASS DUE TO EQUIP. FAILURE, LOST DATA	CONES	TAPES	LINEAR CLEAR/UNLIMITED	WET	4
20020830	4.00	OPEN FIELD	1500	1520	20	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	4
20020830	4.00	OPEN FIELD	1520	1545	25	DAILY START, STOP	END OF DAILY OPERATIONS/ EQUIPMENT BREAKDOWN	NA	NA	NA	NA	4
20020831	3.00	OPEN FIELD	700	810	70	DAILY START, STOP	START OF DAILY OPERATIONS/ EQUIPMENT PREPARATIONS	NA	NA	NA	NA	3
20020831	3.00	OPEN FIELD	810	900	50	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	CONES	TAPES	LINEAR CLEAR/UNLIMITED	DRY	3
20020831	3.00	OPEN FIELD	900	910	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	3
20020831	3.00	OPEN FIELD	910	920	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	CHANGED BATTERIES	NA	NA	NA	NA	3

TABLE D-1 CONT'D

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration min.	Operational Status	Comments	Operational Status - Comments	Track Method	Track Method=Other Explain	Pattern	Field Conditions	No. of People
20020831	3.00	OPEN FIELD	920	1045	85	COLLECTING DATA			CONES		LINEAR/CLEAR/UNLIMITED	DRY	3
20020831	3.00	OPEN FIELD	1045	1100	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	NA	3
20020831	3.00	OPEN FIELD	1100	1120	20	BREAK/LUNCH	BREAK	NA	NA	NA	NA	NA	3
20020831	3.00	OPEN FIELD	1120	1205	45	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	NA	3
20020831	3.00	OPEN FIELD	1205	1305	60	COLLECTING DATA	EQUIP CALIBRATED BEFORE DATA RUN / INCLUDES FENCE CHALLENGE AREA	CONES	TAPES	LIEAR	CLEAR/UNLIMITED	DRY	3
20020831	3.00	OPEN FIELD	1305	1320	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	NA	3
20020831	3.00	OPEN FIELD	1320	1330	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	NA	3
20020831	3.00	OPEN FIELD	1330	1440	70	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	CONES	TAPES	LIEAR	CLEAR/UNLIMITED	DRY	3
20020831	3.00	OPEN FIELD	1440	1450	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	NA	3
20020831	3.00	OPEN FIELD	1450	1500	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	NA	3
20020831	3.00	OPEN FIELD	1500	1600	60	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	CONES	STAKES	LIEAR	CLEAR/UNLIMITED	DRY	3
20020831	3.00	OPEN FIELD	1600	1610	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNLOADING DATA	NA	NA	NA	NA	NA	3
20020831	3.00	OPEN FIELD	1610	1630	20	DAILY START, STOP	END OF DAILY OPERATIONS / EQUIPMENT BREAKDOWN	NA	NA	NA	NA	NA	3
20020901	3.00	OPEN FIELD	700	800	60	DAILY START, STOP	START OF DAILY OPERATIONS / EQUIPMENT PREPARATIONS	NA	NA	NA	NA	NA	3

TABLE D-1 CONT'D

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration min.	Operational Status	Operational Status - Comments	Track Method	Track Method-Other Explain	Pattern	Field Conditions	No. of People	
20020901	3.00	OPEN FIELD	800	900	60	COLLECTING DATA	EQUIPMENT WAS CALIBRATED / RUN INCLUDES GRAVEL CHALLENGE AREA	CONES	STAKES	LINEAR	RAIN & HAZE/LIMITED	WET 3	
20020901	3.00	OPEN FIELD	900	920	20	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNTIME DUE TO EQUIP MAINT/CHECK	NA	NA	NA	NA	LIGHT MUD 3	
20020901	3.00	OPEN FIELD	920	940	20	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA 3	
20020901	3.00	OPEN FIELD	940	1040	60	COLLECTING DATA	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	CONES	TAPES	LINEAR	RAIN & HAZE/LIMITED	WET 3
20020901	3.00	OPEN FIELD	1040	1050	10	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNTIME DUE TO EQUIP MAINT/CHECK	NA	NA	NA	NA	NA 3
20020901	3.00	OPEN FIELD	1050	1105	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNTIME DUE TO EQUIP MAINT/CHECK	PREPARING FOR NEXT RUN	NA	NA	NA	NA	NA 3
20020901	3.00	OPEN FIELD	1105	1205	60	COLLECTING DATA	COLLECTING DATA	EQUIPMENT CALIBRATED / FENCE CHALLENGE AREA	CONES	TAPES	LINEAR	RAIN & HAZE/LIMITED	WET 3
20020901	3.00	OPEN FIELD	1205	1210	5	BREAK/LUNCH	BREAK	NA	NA	NA	NA	NA 3	
20020901	3.00	OPEN FIELD	1210	1235	25	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNTIME DUE TO EQUIP MAINT/CHECK	CHANGED BATTERIES	NA	NA	NA	RAIN/LIMITED WET 3	
20020901	3.00	OPEN FIELD	1235	1335	60	COLLECTING DATA	COLLECTING DATA	SECOND PASS / RECAPTURE LOST DATA	CONES	TAPES	LINEAR	RAIN/LIMITED	WET 3
20020901	3.00	OPEN FIELD	1335	1340	5	DOWNTIME DUE TO EQUIP MAINT/CHECK	DOWNTIME DUE TO EQUIP MAINT/CHECK	DAILY START, STOP	NA	NA	NA	NA	NA 3
20020901	3.00	OPEN FIELD	1340	1350	10	DAILY START, STOP	DAILY START, STOP	END OF DAILY OPERATIONS / EQUIPMENT BREAKDOWN	NA	NA	NA	NA	NA 3
20020902	2.00	OPEN FIELD	800	905	65	DAILY START, STOP	DAILY START, STOP	START OF DAILY OPERATIONS / EQUIPMENT PREP / CHECK BASE STATION	NA	NA	NA	NA 2	

TABLE D-1 CONT'D

Date	No. of People	Area Tested	Status Start Time	Status Stop Time	Duration min.	Operational Status	Operational Status - Comments	Track Method	Track Method=Other Explain	Pattern	Field Conditions	No. of People
20020902	2.00	OPEN FIELD	905	1000	55	COLLECTING DATA	EQUIPMENT WAS CALIBRATED BEFORE DATA RUN USING CAL BALL	TAPES CONES		LINEAR	CLEAR/UNLIMITED	DRY 2
20020902	- 2.00	OPEN FIELD	1000	1015	15	DOWNTIME DUE TO EQUIP MAINT/CHECK	MAINT/CHECK DÉMOBILIZATION	DOWNLOADING DATA	NA	NA	NA	NA 2
20020902	- 2.00	NA	1015	1200	105		END OF TESTING OPERATIONS / FINAL EQUIPMENT BREAKDOWN	NA	NA	NA	NA	NA 2

## **APPENDIX E. REFERENCES**

- 1. Standardized UXO Technology Demonstration Site Handbook, DTC Project No. 8-CO-160-000-473, Report No. ATC-8349, March 2002.**
- 2. Data Summary, UXO Standardized Test Site: APG Soils Description, May 2002.**

## APPENDIX F. ABBREVIATIONS

AEC	= U.S. Army Environmental Center
APG	= Aberdeen Proving Ground
ATC	= U.S. Army Aberdeen Test Center
ERDC	= U.S. Army Edgewood Research, Development and Engineering Center
ESTCP	= Environmental Security Technology Certification Program
EQT	= Army Environmental Quality Technology Program
GPS	= Global Positioning System
GX	= Geosoft executable
QC	= quality control
ROC	= receiver-operating characteristic
RTK	= real time kinematic
SERDP	= Strategic Environmental Research and Development Program
UXO	= unexploded ordnance

**APPENDIX G. DISTRIBUTION LIST**

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